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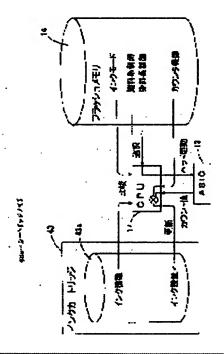
(54) APPARATUS AND METHOD FOR CONTROLLING PRINTER, AND MEDIUM WITH PRINTER CONTROL PROGRAM RECORDED

(57)Abstract:

PROBLEM TO BE SOLVED: To solve the problem that the printing quality is damaged when different system inks mix and a residual amount of ink cannot be properly detected in a printer in which an ink type can be changed by replacing ink cartridges.

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SOLUTION: The type of ink and the residual amount of ink are stored in a nonvolatile memory loaded to the ink cartridge. A type of ink is stored when the ink is supplied to an ink feed system. At a printing time, the stored type of ink is compared with the type of ink stored in the nonvolatile memory. Accordingly, printing control conforming to the types of ink when the types of ink agree can be carried out, and mixing inks can be prevented when the types of ink do not agree. Moreover, the residual amount of ink is updated by calculating the amount of ink used in accordance with driving of a head, so that a correct residual amount of ink can be detected.



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CLAIMS

[Claim(s)]

[Claim 1] A printer control unit characterized by providing the following. Nonvolatile memory which is the printer control unit which controls a printer which prints while supplying ink with which an exchangeable ink cartridge was filled up to an arm head, and memorizes a class of ink with which the ink cartridge concerned is filled up while updating of the content of storage is possible and being carried in the above-mentioned ink cartridge The ink cartridge attachmentand-detachment section which enables data transmission and reception from the abovementioned nonvolatile memory at the time of this ink cartridge wearing while it is removable in the above-mentioned ink cartridge A supply ink storage means to memorize a class of ink currently supplied to an ink supply system from the above-mentioned ink cartridge to the abovementioned arm head A printing condition storage means to memorize according to a class of ink filled up with printing conditions required for actuation of the above-mentioned arm head by the above-mentioned ink cartridge in the above-mentioned printing, A class of ink memorized by a class of ink and the above-mentioned supply ink storage means which were memorized by the above-mentioned nonvolatile memory is compared. A head actuation control means which writes predetermined information in the above-mentioned nonvolatile memory suitably, controlling actuation of an arm head by the condition that a class of both ink is in agreement, based on printing conditions memorized by the above-mentioned printing condition storage means [Claim 2] It is the printer control unit characterized by updating a residue of ink which the above-mentioned nonvolatile memory had memorized a residue of ink with which it fills up at an ink cartridge in a printer control unit given in above-mentioned claim 1, and was memorized by the above-mentioned nonvolatile memory based on the calculation concerned while the abovementioned head actuation control means computed the amount of ink used consumed with actuation of the above-mentioned arm head.

[Claim 3] It is the printer control unit characterized by computing the amount of the ink used based on a counter which the above-mentioned head actuation control means increases with actuation of the above-mentioned arm head in a printer control unit of a publication to above-mentioned claim 2.

[Claim 4] It is the printer control unit characterized by memorizing the amount calculation coefficient of the ink used for computing the amount of the ink used by multiplying by the above-mentioned printing condition storage means in a printer control unit given in above-mentioned claim 3 at counted value of the above-mentioned counter.

[Claim 5] It is the printer control unit characterized by memorizing a driver voltage pattern impressed in case the above-mentioned printing condition storage means drives the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 4. [Claim 6] It is the printer control unit characterized by the above-mentioned printing condition storage means memorizing actuation conditions required for cleaning of an ink supply system in the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 5.

[Claim 7] It is the printer control unit characterized by the above-mentioned printing condition storage means memorizing actuation conditions required for Flushing in the above-mentioned

arm head in a printer control unit given in either above-mentioned claim 1 - claim 6. [Claim 8] It is the printer control unit characterized by the ability to set up so that either or combination of the above-mentioned nonvolatile memory, a supply ink storage means, and a printing condition storage means may forbid a store and elimination of storage information in a printer control unit given in either above-mentioned claim 1 - claim 7.

[Claim 9] It is the printer control unit characterized by the above-mentioned head actuation control means performing a comparison of a class of the above-mentioned ink in a printer control unit given in either above-mentioned claim 1 - claim 8 at the time of exchange of the above-mentioned ink cartridge.

[Claim 10] It is the printer control unit characterized by updating a class of ink memorized by the above-mentioned supply ink storage means after the above-mentioned head actuation control means supplies ink to the above-mentioned ink supply system in a printer control unit given in either above-mentioned claim 1 - claim 9 by class of the supplied ink concerned.

[Claim 11] A printer control method characterized by providing the following. The supply ink storage process of being the printer control method which controls a printer which prints while carrying nonvolatile memory which memorizes a class of ink with which updating of the content of storage is possible and it fills up and supplying ink with which an exchangeable ink cartridge was filled up by detaching and attaching to an applied part to an arm head, and memorizing a class of ink currently supplied to an ink supply system from the above-mentioned ink cartridge to the above-mentioned arm head A printing condition storage process memorized according to a class of ink filled up with printing conditions required for actuation of the above-mentioned arm head by the above-mentioned ink cartridge in the above-mentioned printing The head actuation control process which writes predetermined information in the above-mentioned nonvolatile memory suitably, controlling actuation of an arm head by the condition that compare a class of ink memorized by a class of ink and the above-mentioned supply ink storage process memorized by the above-mentioned nonvolatile memory, and a class of both ink is in agreement, based on printing conditions memorized by the above-mentioned printing condition storage process [Claim 12] The printer control method characterized by to update a residue of ink which memorized a residue of ink with which the above-mentioned nonvolatile memory is filled up at an ink cartridge, and was memorized by the above-mentioned nonvolatile memory based on the calculation concerned while computing the amount of ink used consumed with actuation of the above-mentioned arm head at the above-mentioned head actuation control process in a printer control method given in above-mentioned claim 11.

[Claim 13] A printer control method characterized by computing the amount of the ink used based on a counter which increases to above-mentioned claim 12 with actuation of the above-mentioned arm head at the above-mentioned head actuation control process in a printer control method of a publication.

[Claim 14] A printer control method characterized by memorizing the amount calculation coefficient of the ink used for computing the amount of the ink used by taking the advantage of above-mentioned claim 13 at the above-mentioned printing condition storage process in a printer control method of a publication at counted value of the above-mentioned counter. [Claim 15] A printer control method characterized by memorizing a driver voltage pattern impressed in case the above-mentioned arm head is driven at the above-mentioned printing condition storage process in a printer control method given in either above-mentioned claim 11 - claim 14.

[Claim 16] A printer control method characterized by memorizing actuation conditions required for cleaning of an ink supply system in the above-mentioned arm head at the above-mentioned printing condition storage process in a printer control method given in either above-mentioned claim 11 - claim 15.

[Claim 17] A printer control method characterized by memorizing actuation conditions required for Flushing in the above-mentioned arm head at the above-mentioned printing condition storage process in a printer control method given in either above-mentioned claim 11 - claim 16. [Claim 18] It is the printer control method characterized by the ability to set up so that either or combination of the above-mentioned nonvolatile memory, a supply ink storage process, and a

printing condition storage process may forbid a store and elimination of storage information in a printer control method given in either above-mentioned claim 11 - claim 17.

[Claim 19] A printer control method characterized by performing a comparison of a class of the above-mentioned ink at the time of exchange of the above-mentioned ink cartridge at the above-mentioned head actuation control process in a printer control method given in either above-mentioned claim 11 - claim 18.

[Claim 20] A printer control method characterized by updating a class of ink memorized at the above-mentioned supply ink storage process after supplying ink at the above-mentioned head actuation control process in a printer control method of a publication at the above-mentioned ink supply system to either above-mentioned claim 11 - claim 19 by class of the supplied ink concerned.

[Claim 21] While carrying nonvolatile memory which memorizes a class of ink with which updating of the content of storage is possible and it fills up It is data medium which recorded a printer control program for controlling by computer a printer which prints while supplying ink with which an exchangeable ink cartridge was filled up by detaching and attaching to an applied part to an arm head. A function to read a class of ink memorized by nonvolatile memory of the above—mentioned ink cartridge, and to judge a class of ink in an ink cartridge, A function which reads a class of ink which the printer concerned beforehand indicated to nonvolatile memory carried in the above—mentioned main part of a printer is using, While comparing a class of ink by which reading appearance was carried out [above—mentioned] to a class of ink of the judged above—mentioned ink cartridge Printing conditions memorized according to a class of ink in nonvolatile memory carried in the above—mentioned main part of a printer when a class of both ink was in agreement are read. Data medium which recorded a printer control program characterized by making a computer perform a head actuation control function which writes predetermined information in nonvolatile memory of the above—mentioned ink cartridge suitably, controlling actuation of the above—mentioned arm head.

[Claim 22] It is data medium which recorded the printer control program characterized by to make the residue of the ink which had memorized the residue of the ink in which an ink cartridge is filled up with the above-mentioned nonvolatile memory in data medium which recorded a printer control program of a publication on above-mentioned claim 21, and was memorized by the above-mentioned nonvolatile memory based on the calculation concerned in the above-mentioned head actuation control function while having computed the amount of ink used consumed with actuation of the above-mentioned arm head update.

[Claim 23] Data medium which recorded a printer control program characterized by computing the amount of the ink used by the above-mentioned head actuation control function based on a counter which increases with actuation of the above-mentioned arm head in data medium which recorded a printer control program of a publication on above-mentioned claim 22.

[Claim 24] Data medium which recorded a printer control program characterized by memorizing the amount calculation coefficient of the ink used for computing the amount of the ink used by taking the advantage of counted value of the above-mentioned counter in data medium which recorded a printer control program of a publication on above-mentioned claim 23 by nonvolatile memory which memorizes the above-mentioned printing conditions according to a class of ink. [Claim 25] Data medium which recorded a printer control program characterized by memorizing a driver voltage pattern impressed in case the above-mentioned arm head is driven in data medium which recorded a printer control program of a publication on either above-mentioned claim 21 - claim 24 by nonvolatile memory which memorizes the above-mentioned printing conditions according to a class of ink.

[Claim 26] Data medium which recorded a printer control program characterized by memorizing actuation conditions required for cleaning of an ink supply system in the above-mentioned arm head in data medium which recorded a printer control program of a publication on either above-mentioned claim 21 - claim 25 by nonvolatile memory which memorizes the above-mentioned printing conditions according to a class of ink.

[Claim 27] Data medium which recorded a printer control program characterized by memorizing actuation conditions required for Flushing in the above-mentioned arm head in data medium

which recorded a printer control program of a publication on either above-mentioned claim 21 - claim 26 by nonvolatile memory which memorizes the above-mentioned printing conditions according to a class of ink.

[Claim 28] Either or combination of nonvolatile memory carried in the above-mentioned ink cartridge and a main part of a printer in data medium which recorded a printer control program of a publication on either above-mentioned claim 21 - claim 27 is data medium which recorded a printer control program characterized by the ability to set up so that a store and elimination of storage information may be forbidden.

[Claim 29] Data medium which recorded a printer control program characterized by performing a comparison of a class of the above-mentioned ink at the time of exchange of the above-mentioned ink cartridge by the above-mentioned head actuation control function in data medium which recorded a printer control program of a publication on either above-mentioned claim 21 - claim 28.

[Claim 30] Data medium which recorded a printer control program characterized by to update a class of ink memorized in nonvolatile memory carried in the above-mentioned main part of a printer by the above-mentioned head actuation control function in data medium which recorded a printer control program of a publication on either above-mentioned claim 21 – claim 29 after supplying ink to the above-mentioned ink supply system by class of the supplied ink concerned.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[The technical field to which invention belongs] This invention relates to data medium which recorded the printer control unit, the printer control method, and the printer control program. [0002]

[Description of the Prior Art] As a printer which can perform printing according to image quality equivalent to a photograph, an ink jet printer is spreading quickly in recent years. Generally in this ink jet printer, two kinds such as pigment system ink and color system ink are used. With each property, two kinds of this ink has merits and demerits in image quality, lightfastness, etc., and is widely used by both. Moreover, even if it is the case where viscosity differs from density etc. and the two above—mentioned kinds of ink uses the same arm head, in order to perform suitable printing, making it correspond to said property, control conditions, such as discharge quantity of ink and regurgitation timing, differ in pigment system ink and color system ink, respectively.

[0003]

[Problem(s) to be Solved by the Invention] The following technical problems occurred in the conventional ink jet printer mentioned above. That is, wearing of the ink cartridge of a class which makes a mistake in two kinds of ink, and is different before carrying out exchange and washing of an ink supply system also in an usable printer will mix the ink of a different system inside an ink supply system. Since it becomes impossible to perform discharge quantity control according to the property of ink etc. when two kinds of ink has been mixed, printing quality is spoiled. Therefore, in order to exchange the two above—mentioned kinds of ink and to prevent mixing of the ink in an ink supply system in an usable ink jet printer, exchange and washing of an ink supply system are needed at the time of exchange of an ink class.

[0004] Furthermore, although the residue of the ink with which the ink cartridge is filled up in the ink jet printer may be supervised and it may display as the status Before exhausting ink in the conventional ink jet printer mentioned above, from an exchangeable thing, an ink cartridge in pigment system ink and color system ink When the class of ink was changed and the class of ink was returned further once again after using ink to the middle, there was a problem that the ink residue of the original cartridge could not be judged correctly.

[0005] This invention was made in view of the above-mentioned technical problem, and even if it changes an ink cartridge what times, it aims at offering the printer control unit which can judge an ink residue correctly, the printer control method, and a printer control unit, while carrying out proper control according to an ink class, preventing mixing of the ink of a different system in the printer which can exchange an ink class.

[0006]

[Means for Solving the Problem] Invention which starts claim 1 in order to attain the above—mentioned object is constituted so that a printer which prints while supplying ink with which an exchangeable ink cartridge was filled up to an arm head may be controlled, and it is controlled, preventing mixing of an ink class. For this reason, nonvolatile memory which can update the content of storage is carried in an exchangeable ink cartridge, and a class of ink with which an

ink cartridge is filled up is memorized by this nonvolatile memory. This ink cartridge is detached and attached through an ink cartridge applied part by main part of a printer, and data transmission and reception from the above-mentioned nonvolatile memory are possible for it at the time of wearing.

[0007] Furthermore, a class of ink currently supplied to an ink supply system which consists of ink supply tubes from an ink cartridge to an arm head etc. is memorized by supply ink storage means, and printing conditions required for actuation of an arm head are memorized by printing condition storage means according to a class of ink. A head actuation control means uses such storage information in printing, and compares a class of ink memorized by a class of ink and the above-mentioned supply ink storage means which were memorized by nonvolatile memory. And actuation of an arm head is controlled based on printing conditions which drive an arm head in the condition that a class of both ink is in agreement, and suit this ink class in agreement. [0008] Namely, a class of ink memorized by the above-mentioned nonvolatile memory is uniquely in agreement with a class of ink with which an ink cartridge was filled up. Since a class of ink memorized by supply ink storage means is uniquely in agreement with a class of ink currently supplied to an ink supply system When a head actuation control means compares these, it can prevent driving an arm head using an ink cartridge of a class of different ink from a class of ink already supplied to an ink supply system, and mixing of ink can be prevented. [0009] Here, updating of the content of storage is possible for it, and if the above-mentioned nonvolatile memory is nonvolatile, can adopt good various modes and is constituted from EEPROMs, such as a flash memory, it is suitable. Moreover, although what is necessary is just to memorize whether a class of ink is the thing of whether restoration ink is the thing of a color system as information which is used in order to prevent mixing of ink as mentioned above, and for that shows a class of ink, and a pigment system, it is possible to memorize various information in addition to this as a class of ink. That is, by referring to the restoration day concerned, if a restoration day of ink is memorized, it can constitute so that ink over which the expiration date passed may not be used. Moreover, even if it is ink of a same system, actuation of an arm head is controllable by the best actuation sequence over the ink by memorizing information which shows a purport from which a component differs.

[0010] It is removable in an ink cartridge, and the ink cartridge attachment-and-detachment section equips a holder of a fitting type with a container which has capacity which can be filled up with ink that what is necessary is just to be able to enable data transmission and reception from nonvolatile memory at the time of ink cartridge wearing, and a configuration which secures a flow of a terminal of nonvolatile memory to fitting concerned and coincidence is possible for it. It can constitute from rewritable various memory that what is necessary is just to be able to memorize a class of ink currently supplied to an ink supply system in a supply ink storage means. Although RAM etc. can constitute, if a printer is frequently constituted from EEPROMs, such as a flash memory, a place whose power supply is what is turned on / turned off, it is suitable. [0011] It can constitute from various memory that what is necessary is just to be able to memorize according to a class of ink filled up with printing conditions required for actuation of an arm head by the above-mentioned ink cartridge in a printing condition storage means. Although a mask ROM etc. can also constitute, the status changes with activities serially, and since it is the mode which can change activity ink, if especially this invention is constituted from EEPROMs, such as a rewritable flash memory, it is suitable [this invention] for a printer. If a head control driving means is constituted from a CPU etc., it is [that what is necessary is to read and calculate information from various memory etc. and just to be able to control memory, an arm head, etc.] suitable.

[0012] As a configuration for controlling to be able to judge an ink residue correctly, furthermore, invention according to claim 2 In a printer control unit given in above-mentioned claim 1 the above-mentioned nonvolatile memory A residue of ink with which an ink cartridge is filled up is memorized, and the above-mentioned head actuation control means is considered as a configuration which updates a residue of ink memorized by the above-mentioned nonvolatile memory based on the calculation concerned while it computes the amount of ink used consumed with actuation of the above-mentioned arm head.

[0013] That is, since a residue of ink is updated with actuation of a printer, it becomes the residue of proper ink. Since a residue of ink is memorized by nonvolatile memory carried in the ink cartridge itself, it removes, before consuming ink with which it filled up, other ink cartridges are used, and an ink residue will become proper even if it uses an ink cartridge removed again. of course — even if it uses it, removing an ink cartridge and making other printers equip — being concerned — others — if a printer control unit which requires a printer for this invention is provided, it will become a proper ink residue.

[0014] Moreover, the technique of computing the amount of ink used by head actuation control means is various, and invention according to claim 3 is considered as a configuration which computes the amount of the ink used based on a counter which the above-mentioned head actuation control means increases with actuation of the above-mentioned arm head in a printer control unit given in above-mentioned claim 2 as an example of a configuration for it. That is, since an arm head drives at the time of printing, if a counter which counted value increases with actuation of the arm head concerned is used, based on the counted value concerned, the amount used is easily computable. The technique of more specifically counting the number of dots which carries out the regurgitation by arm head is employable. What is necessary is just to compute the amount used for every class of ink based on the number of dots, although the amount used may change with classes of ink also with the same number of dots since a class of ink can be changed in this invention. Thus, when computing the amount of ink used based on counted value, especially this count should just form a single counter, without distinguishing according to a class of ink.

[0015] As an example of printing conditions which various conditions exist as printing conditions required for actuation of the above-mentioned arm head, and need to be memorized according to a class of ink, furthermore, invention according to claim 4 In a printer control unit given in above-mentioned claim 3, the above-mentioned printing condition storage means is considered as a configuration which memorizes the amount calculation coefficient of the ink used for computing the amount of the ink used by taking an advantage at counted value of the above-mentioned counter.

[0016] That is, since above-mentioned counted value and the amount of ink used are usually in proportionality, if the amount calculation coefficient of the ink used which computes the amount of the ink used by taking the advantage of counted value is prepared, the amount used can be easily obtained from counted value only by 1 time of multiplication. Moreover, it can constitute very easily [that the amount coefficient of the ink used for every class of ink may only be memorized], and in order to compute the amount used for every class of ink, also when it is necessary to correspond to ink in which a class of ink increases or properties differ, it can respond easily.

[0017] Furthermore, invention according to claim 5 is considered as a configuration which memorizes a driver voltage pattern impressed in case the above-mentioned printing condition storage means drives the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 4 as other examples of printing conditions which need to be memorized according to a class of ink. That is, when classes of ink differ like ink of a pigment system, and ink of a color system, conditions which drive an arm head differ. For example, if the above-mentioned ink classes differ in the case of a printer which controls discharge quantity, regurgitation timing, etc. of ink by telescopic motion of a piezo-electric element etc., 1 time of ink discharge quantity differs from regurgitation timing etc. Since it is controlled by changing a driver voltage pattern impressed to an arm head, such discharge quantity etc. can perform printing according to a class of ink easily, if a driver voltage pattern is memorized according to a class of ink as printing conditions.

[0018] Furthermore, invention according to claim 6 is considered as a configuration which memorizes actuation conditions which the above-mentioned printing condition storage means needs for cleaning of an ink supply system in the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 5 as other examples of printing conditions which need to be memorized according to a class of ink. Namely, since an ink supply system may be cleaned, ink is once discharged in this case and wiping etc. is carried out when a case where

a printer is not used for a long time, and printing quality have deteriorated, in order to make blowdown perform exactly, it is necessary to drive an arm head a condition for every class of ink, and, in such a case, can respond.

[0019] Furthermore, since a class of ink can be exchanged in this invention, it is necessary to also wash an ink supply system from a cartridge to an arm head on the occasion of exchange, and when performing this washing sequence, in order to make ink of an ink supply system discharge exactly, it is necessary to drive an arm head a condition for every class of ink, and, also in such a case, can respond.

[0020] Furthermore, invention according to claim 7 is considered as a configuration which memorizes actuation conditions which the above-mentioned printing condition storage means needs for Flushing in the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 6 as other examples of printing conditions which need to be memorized according to a class of ink. Namely, although Flushing may be performed in order to carry out regurgitation blowdown of the color mixture ink which flowed backwards from a nozzle by wiping or to prevent blinding by thickening of ink, from it being what should be determined with the property of an ink class, timing which performs this Flushing, and a regurgitation discharge at the time of Flushing need to drive an arm head a condition for every class of ink, in order to perform Flushing exactly, and, in such a case, can respond.

[0021] Furthermore, when a power supply of a printer is turned off suddenly, mixing of ink is prevented after re-powering on. As an example for judging an ink residue appropriately and constituting it possible [activation of head actuation for every class of ink] exactly, invention according to claim 8 In a printer control unit given in either above-mentioned claim 1 – claim 7, either or combination of the above-mentioned nonvolatile memory, a supply ink storage means, and a printing condition storage means is considered as a configuration which can be set up so that a store and elimination of storage information may be forbidden.

[0022] That is, if a store and elimination of storage information can be forbidden, when a case where a power supply was turned off suddenly and a power supply becomes instability, and a noise increase, required storage information is not updated and a printer can be driven in the original condition after re-powering on. For example, since storage information on a supply ink storage means is still origin, in spite of having already supplied ink after re-powering on at an ink supply system, it is going to perform supply of further different ink and ink is not mixed. Moreover, an arm head is not driven using ink currently supplied to an ink supply system, and different ink. Furthermore, when a power supply becomes instability, information for computing the above-mentioned amount of the ink used is memorized for a printing condition storage means etc., and if an ink residue is updated based on the memorized amount of the ink used concerned after a power supply is stable, a more exact ink residue can be obtained. Here, as a flume which forbids a store and elimination of storage information, when storage information needs to be updated of course, it updates by canceling a prohibition condition of a store and elimination.

[0023] Furthermore, invention according to claim 9 is considered as a configuration in which the above-mentioned head actuation control means performs a comparison of a class of the above-mentioned ink at the time of exchange of the above-mentioned ink cartridge in a printer control unit given in either above-mentioned claim 1 – claim 8 as an example of a configuration for controlling to prevent mixing of ink in the above-mentioned head actuation control means. That is, a printer concerning this invention is considered [mistaking a class of ink in many cases at the time of this exchange since it is exchangeable, and] in an ink cartridge, and can prevent mixing of ink certainly by performing the above-mentioned comparison at the time of this exchange. It constitutes so that various modes can be adopted in order to detect exchange of an ink cartridge here, for example, it may remove with the time of wearing of an ink cartridge and a predetermined signal may sometimes be outputted, and when a signal which shows wearing is detected, it can constitute so that a comparison may be performed.

[0024] Furthermore, invention according to claim 10 has considered [as an example of the configuration for preventing mixing of ink in the above-mentioned head actuation control means] as the configuration which updates at a class of the supplied ink concerned in a class of ink

memorized by the above-mentioned supply ink storage means in a printer control unit given in either above-mentioned claim 1 - claim 9, after the above-mentioned head actuation control means supplies ink to the above-mentioned ink supply system.

[0025] That is, since a printer concerning this invention can change suitably a class of ink used by exchange of a cartridge, in case it changes a class of the ink concerned, it will also wash ink currently supplied to the above-mentioned ink supply system, and will newly be resupplied. Then, if a class of ink memorized by supply ink storage means by head actuation control means after supply of ink to an ink supply system is updated, an arm head can be driven using always proper ink by the comparison of a class of the above-mentioned ink, even if it carries out the message exchange of ink what times, and mixing of ink can be prevented.

[0026] Thus, while memorizing a class of ink, and a residue of ink to nonvolatile memory carried in an ink cartridge and preventing mixing of ink with reference to these, the technique of grasping a residue of ink proper does not necessarily need to be restricted to equipment with substance, and functioning also as the method can be understood easily. For this reason, invention concerning claim 11 – claim 20 is considered as a configuration corresponding to a control method which said printer control unit enforces. That is, there is no difference not only in equipment which not necessarily has substance but in being effective as the method.
[0027] By the way, such a printer control unit contains not only this but various kinds of modes as thought of that it may be used in the condition of existing independently and having been included in a certain device, and invention. Therefore, it can change suitably that it is software or hardware etc. When becoming the software of a printer control unit as an example of embodiment of thought of invention, naturally it exists on a record medium which recorded this software, and it must be said that it is used. Invention which starts claim 21 – claim 30 in the semantics is considered as a configuration corresponding to each step which makes said printer control unit carry out by computer.

[0028] of course, the record medium may be magnetic-recording data medium, may be magneto-optic-recording data medium, and can completely be considered the same way in any record media developed from now on. Moreover, about duplicate phases, such as a primary replica and a secondary replica, it is equivalent without room to completely ask. If above-mentioned data medium is the case where it carries out as the supply method using a communication line although it differs, a communication line serves as a transmission medium and this invention will be used.

[0029] Furthermore, a part is software, when a part is realized by hardware, there is nothing that is completely different in thought of invention, and it may be made into a thing of a gestalt which memorizes a part on a record medium and is read suitably if needed. Moreover, when carrying out this invention by software, it not only realizes as data medium by which invention recorded a program, but naturally this invention is realized as the program itself, and the program itself is included in this invention.

[0030]

[Effect of the Invention] According to invention which starts claim 1, claim 11, and claim 21 as explained above, mixing of ink can be prevented, and data medium which recorded the printer control unit which can perform suitable control according to the class of ink, the printer control method, and the printer control program can be offered.

[0031] Moreover, according to invention concerning claim 2, claim 12, and claim 22, the proper ink residue in an ink cartridge can be judged. Furthermore, according to invention concerning claim 3, claim 13, and claim 23, the amount of the ink used is easily computable. Furthermore, according to invention concerning claim 4, claim 14, and claim 24, the configuration for computing the amount used for every class of ink can be realized easily, and the amount used can be easily obtained from counted value. Furthermore, according to invention concerning claim 5, claim 15, and claim 25, printing according to the class of ink can be performed easily.

[0032] Furthermore, according to invention concerning claim 6, claim 16, and claim 26, it can clean the condition for every class of ink. Furthermore, according to invention concerning claim 7, claim 17, and claim 27, Flushing can be performed the condition for every class of ink. Furthermore, according to invention concerning claim 8, claim 18, and claim 28, when the power

supply of a printer is turned off suddenly, mixing of ink can be prevented after re-powering on, an ink residue can be judged appropriately, and head actuation for every class of ink can be performed exactly. Furthermore, according to invention concerning claim 9, claim 19, and claim 29, mixing of ink can be prevented certainly. Furthermore, according to invention concerning claim 10, claim 20, and claim 30, mixing of ink can be prevented certainly. [0033]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing. <u>Drawing 1</u> is the outline perspective diagram showing the internal configuration of the ink jet printer carrying the printer control unit concerning 1 operation gestalt of this invention, and <u>drawing 2</u> is the block diagram showing the connection condition of each hardware of the ink jet printer concerned. In drawing, it has the Maine substrate 11 and the printing section 20, the panel section 30, and the cartridge section 40 are connected to the Maine substrate 11, and an ink jet printer 10 functions as a printer, when CPU12 which it had on the Maine substrate 11 controls each part.

[0034] On the Maine substrate 11, it has others, ASIC13, a flash memory 14, and the head actuator 16. [above / CPU 12] ASIC13 is IC customized since the arm head 22 mentioned later was driven, and it performs processing for head 22 actuation, transmitting and receiving the above CPU 12 and a predetermined signal. As one of the processing of this, it has the amount counter of the ink used, and the number of dots printed is counted for every ink color. In addition, the applied-voltage data to the head actuator 16 which mentions later is outputted. The head actuator 16 generates the applied-voltage pattern to the piezo-electric element built in the arm head 22 which is the circuit which consists of Dedication IC, a transistor for actuation, a heat sink, etc., and is mentioned later.

[0035] A flash memory 14 is EEPROM which can eliminate the content of storage electrically, and can eliminate data per a chip package or block. Furthermore, the flash memory 14 concerning this operation gestalt is a boot block mold, and can forbid the store and elimination of hardware-data to a predetermined block.

[0036] The printing section 20 is mainly equipped with the roller 21 and the arm head 22, and the arm head 22 is connected with the above-mentioned Maine substrate 11 through the predetermined trunk cable. Rotating by the motor which is driven by the motor control section which is not illustrated and which is not illustrated, the roller 21 is constituted so that a print sheet may be sent. while the arm head 22 is carried in the carriage which is not illustrated and this carriage makes an arm head 22 arrange near the periphery of the above-mentioned roller 21 -- an arm head 22 -- the shaft orientations of a roller 21 -- a round trip -- it is made movable. [0037] Tube 22a of each ink color exception is connected to the arm head 22, and supply of each color ink is received. Moreover, the arm head 22 is equipped with the piezo-electric element which is not illustrated, and when a piezo-electric element drives at the ink room which is open for free passage from above-mentioned tube 22a to a delivery, the regurgitation of the ink is carried out per dot. The wiring on a predetermined trunk cable and a substrate connects, and this head actuator 16 impresses this generation voltage to an arm head 22 while generating predetermined voltage according to the command from the above ASIC 13, and as for an arm head 22 and the head actuator 16, it drives the above-mentioned carriage and a piezo-electric element.

[0038] The panel section 30 is equipped with the liquid crystal display object 31 and the manual operation button 32, and the panel section 30 is connected with the above-mentioned Maine substrate 11 by the predetermined trunk cable through panel I/O33. The liquid crystal display object 31 is a display which displays an alphabetic character etc. based on the predetermined signal transmitted from CPU12, and can display an error message, the status, etc. A manual operation button 32 is a carbon button used in case a user and a serviceman operate an ink jet printer 10, and by independent carbon button pushing actuation or two or more carbon button pushing actuation, the above CPU 12 distinguishes the content of actuation, and can direct now ON/OFF of a power supply, blowdown of print data, discharge of an error message, activation of the ink message exchange, activation of cleaning, etc.

[0039] The cartridge section is mainly equipped with the sub substrate 41, the cartridge holder

42, and the ink cartridge 43. The ink jet printer 10 concerning this operation gestalt uses cyanogen, a Magenta, yellow, light cyanogen, a light Magenta, and six colors of black, and fills up an ink cartridge 43 with each ink. The ink cartridge carries cartridge memory 43a, and the class of ink and the residue of ink with which it fills up are memorized by this cartridge memory 43a. Here, the data in which it is shown whether it is color system ink as a class of ink or it is pigment system ink is recorded. That is, this cartridge memory 43a constitutes the above—mentioned nonvolatile memory. Each cartridge holder 42 is equipped with contact section 42a with cartridge memory 43a, if the cartridge holder 42 is equipped with an ink cartridge 43, will contact cartridge memory 43a and will secure the connection for data transmission and reception. Moreover, the above—mentioned cartridge holder 42 is equipped with the ink supply needle which is not illustrated, if equipped with an ink cartridge 43, will contact the ink feed hopper with which this ink cartridge 43 is equipped and which is not illustrated, and will form the supply path of ink. The ink with which tube 22a was attached in the cartridge holder 42, and it filled up in the ink cartridge 43 through this tube 22a is supplied to the above—mentioned arm head 22.

[0040] It is carried in an ink jet printer 10 by equipping the cartridge holder 42 with each ink cartridge 43, and where the cartridge holder 42 is equipped, while ink supply is attained through the above-mentioned tube 22a, transmission and reception of data of the above-mentioned cartridge memory 43a are attained. That is, the predetermined trunk cable 40 is connected to the cartridge holder 42, and where the cartridge holder 42 is equipped with an ink cartridge 43, the communication line of the trunk cable 40 concerned and cartridge memory 43a is secured. Thus, in this operation gestalt, the cartridge holder 42 constitutes the above-mentioned applied part.

[0041] The above-mentioned cartridge memory 43a is controlled by transmitting and receiving a predetermined signal from control IC41a which the trunk cable 40 connected to the cartridge holder 42 was connected to the sub substrate 41, and was carried on this sub substrate 41. The sub substrate 41 is connected to the above-mentioned Maine substrate 11 through the further predetermined trunk cable. The above-mentioned control IC41a is IC carried in order to control using two or more ink, i.e., two or more cartridge memory 43a, and performs read-out of the class of ink recorded on cartridge memory 43a, renewal of an ink residue, etc. by CPU12 on the Maine substrate transmitting and receiving a predetermined signal, and performing control IC41a and a communication link. Moreover, in this operation gestalt, in order to distinguish whether attachment and detachment of an ink cartridge 43 were performed, when the above-mentioned control IC41a outputs the signal which shows removal of an ink cartridge 43 when an ink cartridge 43 is removed from the cartridge holder 42 and it is equipped with an ink cartridge 43, the above-mentioned control IC41a outputs the signal which shows wearing of an ink cartridge 43.

[0042] On the above-mentioned Maine substrate 11, it has further predetermined communication link I/O15, and connects with the computer 50 of the exterior of an ink jet printer 10 through this communication link I/O15. If the driver for this ink jet printer 10 is installed in the computer 50 and a user performs printing of digital photograph data, while a driver will perform predetermined data conversion etc., print data and printing directions are transmitted to an ink jet printer 10, and the above CPU 12 prints print data according to printing directions. [0043] Drawing 3 shows the important section of the memory map of a flash memory 14. Since the both sides of the ink of a color system and the ink of a pigment system are usable, in order that they may perform suitable control to the ink of both systems in a flash memory 14, as for the ink jet printer 10 concerning this operation gestalt, the parameter according to system of ink etc. is memorized. The initial flag which shows whether initial restoration filled up with predetermined ink in an ink supply system, i.e., the above-mentioned tube 22a, was specifically performed, and the ink mode which shows the class of ink current in use are memorized. [0044] Furthermore, the printing conditions which are an actuation parameter according to class of ink are memorized to each of the ink of a pigment system, and the ink of a color system. These data is memorized by the protection block which can forbid the store and elimination of hardware-data. Thus, in this operation gestalt, a flash memory 14 constitutes the abovementioned supply ink storage means and a printing condition storage means. There are a counter coefficient, driver voltage, cleaning conditions, and the Flushing conditions as printing conditions, and a counter coefficient is a coefficient by which the counted value in the above ASIC 13 is multiplied, and computes appropriately the amount of the ink used of both a pigment system and a color system from a unified count which is called the number of dots by the multiplication concerned. Moreover, since the ink of a pigment system differs from the ink of a color system, the property, i.e., the viscosity etc., of ink etc., though same actuation of the regurgitation of ink, cleaning, Flushing, etc. is carried out, concrete actuation of an arm head 22 differs. [0045] Then, driver voltage, cleaning conditions, and the Flushing conditions are memorized for every system, and CPU12 reads this data and directs it to the above ASIC 13, and when the head actuator 16 carries out predetermined head actuation according to the directions concerned, suitable control is performed to the ink of both systems. For example, driver voltage is data in which the pattern of the applied voltage generated in the above–mentioned head actuator 16 at the time of printing is shown, and impresses voltage by pattern which is different as shown in drawing 4.

[0046] That is, if the driver voltage as printing conditions consists of a look-up table which indicated timer data and CPU12 directs to ASIC13 with reference to this lookup data, ASIC13 will change the timer data concerned and will output applied-voltage data to the head actuator 16. The head actuator 16 generates the pulse which is the temporal response of voltage with said applied-voltage data. While a pulse mainly has a lifting pulse and a downward pulse and applied voltage rises in a lifting pulse, the above-mentioned piezo-electric element drives, and the capacity of an ink room decreases. Moreover, while applied voltage descends in a downward pulse, the above-mentioned piezo-electric element drives, and the capacity of an ink room increases. Therefore, by adjusting the width of face of these pulses, the voltage which the above-mentioned head actuator 16 generates becomes abbreviation trapezoidal shape as shown in drawing 4, and the regurgitation of ink is controlled by this voltage.

[0047] The voltage pattern of this <u>drawing 4</u> upside is the thing of a pigment system, inputs a downward pulse in a period t11 first, and makes the capacity of an ink room increase in the ink of the pigment system concerned. And after falling and making the condition of ink attach by suspending the input of a pulse in a period t12, and holding a piezo-electric element, a lifting pulse is inputted, the capacity of an ink room is decreased, and ink is made to breathe out in a period t13. Furthermore, the input of a pulse is suspended in a period t14, this condition is held, a downward pulse is inputted in a period t15, and regurgitation ink is divided. Then, while suspending the input of a pulse in a period t16 and carrying out fixed period maintenance of this condition, carriage is driven and the ink regurgitation sequence over the following dot is performed.

[0048] On the other hand, the voltage pattern of the <u>drawing 4</u> bottom is the thing of a color system, in the ink of the color system concerned, inputs a lifting pulse in a period t21 first, and decreases the capacity of an ink room. And after falling and making the condition of ink attach by suspending the input of a pulse in a period t22, and holding a piezo-electric element, this condition is held in a period t24, it falls and the condition of ink is made to input a downward pulse, to make the capacity of an ink room increase, and to attach in a period t23. Furthermore, a lifting pulse is inputted again, the capacity of an ink room is decreased, and ink is made to breathe out in a period t25. This condition is held in next in a period t26, a downward pulse is inputted into it in a period t27, regurgitation ink is divided, this condition is held in a period t28, and the regurgitation sequence of 1 dot is ended.

[0049] Thus, in the ink of a pigment system, and the ink of a color system, head actuation patterns also differ from the difference in an ink property, in order to perform control suitable for each system, driver voltage is held according to the ink system, and according to the class of ink, it is referred to suitably. Besides the driver voltage at the time of this printing, it is generable [the head actuator 16 / the voltage for cleaning or Flushing], and an arm head 22 can perform the regurgitation of the ink which is unrelated to printing with the voltage concerned. That is, on the other hand, the pump unit 24 is arranged directly under the edge, and attraction of thickening ink and initial restoration processing to tube 22a can be performed by making negative pressure

act to the arm head 22 of a reciprocating motion of an arm head 22 conveyed to this pump-unit location.

[0050] The head actuator 16 impresses predetermined driver voltage to a pump unit 24 through the cable which is not illustrated. If fixed time amount passes during printing, the Flushing conditions according to the class of ink will be referred to. An arm head 22 is made to perform the predetermined ink regurgitation, and while referring to the cleaning conditions according to an ink class according to the predetermined actuation in the above-mentioned manual operation button 32, predetermined cleaning actuation can be performed on an arm head 22. Furthermore, after exchange of an ink cartridge, initial restoration processing to tube 22a is performed.
[0051] Drawing 5 is the schematic diagram having shown the outline of the control which the printer control unit applied to this invention in the above-mentioned configuration carries out. In order for the above CPU 12 to bear the main control in the printer control unit and to perform processing according to the class of ink, CPU12 compares the ink mode memorized by the class and flash memory 14 of the ink memorized by the above-mentioned cartridge memory 43a. It prints in the condition of having made in agreement the class of ink in which under the current activity memorized as ink mode (i.e., an ink supply system) is filled up with ink, and the class of ink with which the ink cartridge 43 is filled up.

[0052] Moreover, since an arm head 22 is driven on the conditions which suited the class of ink it was presupposed that it was in agreement of ink with these comparisons, with reference to a flash memory 14, an arm head 22 is driven using the parameter of pigment system control or color system control according to the class of ink current in use. Furthermore, by updating it from the ink residue of the above-mentioned cartridge memory 43a, as the amount used concerned is reduced, while computing the amount of the ink used by multiplying the number of dots counted by ASIC13 by the counter coefficient according to the class of ink, even if it is pigment system ink and is color system ink, the ink residue is memorized to accuracy. Thus, in this operation gestalt, CPU12, ASIC13, the head actuator 16, and control IC41a constitute the above-mentioned head actuation control means.

[0053] Drawing 6 -8 show the flow chart of the processing which CPU12 performs with an ink jet printer 10 including the above control. Drawing 6 is processing performed after boot of an ink jet printer 10, and CPU12 distinguishes whether the above-mentioned initial flag is ON with reference to a flash memory 14 at step S100. Processing for being filled up with ink in the tube 22a concerned is performed noting that ink supply systems, such as above-mentioned tube 22a, are not filled up with ink, when it is not distinguished at this step S100 that an initial flag is ON. [0054] At this time, in step S105, CPU12 performs the above-mentioned control IC41a and a communication link, carries out reading appearance of the ink class of cartridge memory 43a to this control IC41a, and grasps the class of ink of six colors each. At step S110, it distinguishes whether the class of this read ink is the same class also as six colors, when it is not distinguished that it is the same class, the panel section 30 is controlled by step S115 through above-mentioned panel I/O33, and the error message A shown in the liquid crystal display object 31 at drawing 9 is displayed.

[0055] An error message A is a message "six colors of cartridges are not unified", and the processing after the above-mentioned step S105 is repeated, urging exchanging the ink cartridge 43 which the user was mistaken in and was inserted where the message concerned is displayed to a proper thing. When the class of ink is distinguished at the above-mentioned step S110 as it is the same class also as six colors, restoration processing of ink to an ink supply system is performed at step S120. The restoration processing concerned is a special sequence which makes an ink supply system fill up with ink, after this sequence is performed, an ink supply system is filled up with the ink in an ink cartridge, and the ink interior of a room of an arm head 22 is also filled up with ink. Therefore, if the piezo-electric element in an arm head 22 is driven in this condition, ink will be breathed out from the nozzle of an arm head 22.

[0056] After this restoration processing, the class of ink which accessed the above-mentioned flash memory 14 at step S125, and carried out [above-mentioned] restoration is set up as ink mode. Furthermore, the above-mentioned flash memory 14 is accessed at step S130, and the above-mentioned initial flag is set. When it is distinguished at the case where such restoration

processing is performed, and the above-mentioned step S100 that an initial flag is ON, while accessing the above-mentioned flash memory 14 at step S135 and reading the above-mentioned ink mode, reading appearance of the ink class of cartridge memory 43a is carried out to the above-mentioned control IC41a at step S140, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped.

[0057] And it distinguishes whether the ink mode memorized by the class and flash memory 14 of the ink filled up with step S145 into the ink cartridge 43 is in agreement. When both were in agreement at step S145 and it is distinguished, printing processing is performed at step S200. If both are in agreement at step S145, when not being distinguished, the panel section 30 is controlled by step S150 through above—mentioned panel I/O33, and the error message B shown in the liquid crystal display object 31 at drawing 10 is displayed.

[0058] An error message B is a message of "being equipped with the ink in which ink modes differ", and the processing after the above-mentioned step S140 is repeated, urging exchanging the ink cartridge 43 which the user was mistaken in and was inserted where the message concerned is displayed to a proper thing. Processing which is standing by and shows that printdata transmission is carried out with printing directions from the above-mentioned computer 50 in printing processing of step S200 to drawing 7 after printing directions is performed.

[0059] At step S205, the above ASIC 13 is accessed, a counter is cleared to "0" at the amount step S210 of the ink used in this ASIC13, reading appearance of the ink class of cartridge memory 43a is carried out to the above-mentioned control IC41a at step S210, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped. And a flash memory 14 is accessed at step S215, and the printing conditions which suited the class of the ink concerned are read.

[0060] Printing is performed driving a part for a predetermined line based on the print data transmitted from the above-mentioned computer 50 after step S220. At step S220, with reference to the driver voltage of the printing conditions which suited the class of the above-mentioned ink, a command is transmitted to the above ASIC 13, and an arm head 22 is driven by making the head actuator 16 output the above-mentioned pulse. Thus, an arm head 22 is driven, and at step S225, the count is performed by ASIC13, moving an arm head 22 by carriage and performing printing.

[0061] after printing for a predetermined line is completed, reading appearance of the counter coefficient which accessed the flash memory 14 at step S230, and suited the class of ink is carried out, and the amount of the ink used is computed by multiplying by the counter coefficient concerned which carried out reading appearance and the counted value of the above ASIC 13 at step S235. As the amount of the ink used which computed the command at this step S235 from delivery and the ink residue memorized at cartridge memory 43a is reduced to the above—mentioned control IC41a, it is made to update the ink residue concerned at step S240. In step S245, the above ASIC 13 is accessed and a counter is again cleared to "0" at the amount step S210 of the ink used in this ASIC13.

[0062] And the processing after the above-mentioned step S220 is repeated until it distinguishes that it was finished whether printing all the print data transmitted from the above-mentioned computer 50 in step S250 and having finished printing is distinguished. In addition, in one end position of a reciprocating motion according [the above-mentioned arm head 22] to carriage, Flushing is made with this operation gestalt. That is, after fixed time amount passes during printing, an arm head 22 is conveyed even to the Flushing field, and Flushing is performed, reading the Flushing conditions which suit the class of ink read from the flash memory 14 at the above-mentioned step S210. Moreover, when an ink cartridge 43 is removed in this operation gestalt, in order to prevent continuing performing printing, when the signal which control IC41a outputs when the above-mentioned ink cartridge 43 is removed is detected, processing which interrupts processing of steps S205-S250 of drawing 7, and is shown in drawing 8 is performed. [0063] If the signal which shows that the ink cartridge 43 was removed is detected, the panel section 30 will be controlled by step S305 through above-mentioned panel I/O33, and the error message C shown in the liquid crystal display object 31 at drawing 11 will be displayed. An error message C is a message "equip with a cartridge", and the processing after the above-mentioned

step S305 is repeated until the signal which shows that it equipped with the ink cartridge 43 at step S310 is detected a user urging equipping with an ink cartridge 43 where the message concerned is displayed. If the signal which shows that it equipped with the ink cartridge 43 at step S310 is detected, while accessing the above-mentioned flash memory 14 at step S315 and reading the above-mentioned ink mode, reading appearance of the ink class of cartridge memory 43a is carried out to the above−mentioned control IC41a at step S320, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped. [0064] And it distinguishes whether the ink mode memorized by the class and flash memory 14 of the ink filled up with step S325 into the ink cartridge 43 is in agreement. If both are in agreement at step S325, when not being distinguished, the panel section 30 is controlled by step S330 through above-mentioned panel I/O33, and the error message B shown in the liquid crystal display object 31 at drawing 10 is displayed. when both were in agreement at step S325 and it is distinguished, reading appearance of the counter coefficient which accessed the flash memory 14 at step S325, and suited the class of ink is carried out, and the amount of the ink used is computed by multiplying by the counted value currently held at step S340 by the counter coefficient which carried out reading appearance and Above ASIC 13 concerned. [0065] As the amount of the ink used which computed the command at this step S340 from delivery and the ink residue memorized at cartridge memory 43a is reduced to the abovementioned control IC41a, it is made to update the ink residue concerned at step S345. That is, after the restoration ink of an ink cartridge 43 with which it is re-equipped judges whether it is the right, an ink residue is updated based on the counted value counted until the cartridge was extracted. Therefore, even if it is the case where an ink cartridge 43 is in the middle of printing, and is removed, it becomes a right ink residue. Then, it returns to the printing processing shown in above-mentioned drawing 7.

[0066] Furthermore, in this operation gestalt, it is usable in the both sides of the ink of a pigment system, and the ink of a color system, and the class of the ink concerned can be changed. On the occasion of exchange of an ink system, if the ink of both systems is mixed, in a print, it will not become suitable coloring, and various inconvenience arises from the actuation patterns of head 22 grade differing. Therefore, on the occasion of exchange of an ink system, it is necessary to also carry out washing of the above-mentioned ink supply system. When a user or a serviceman performs predetermined pushing actuation with the manual operation button 32 of the above-mentioned panel section 30, it is possible to carry out the message exchange of ink. [0067] That is, if predetermined pushing actuation is performed in the above-mentioned manual operation button 32, the predetermined trigger according to the actuation concerned will be outputted, and if CPU12 receives the trigger concerned, even if printing will perform, the message exchange shown in step S400 of drawing 6 is performed. Expressing a predetermined guidance message on the liquid crystal display object 31 of the above-mentioned panel section 30 as step S410 in this message exchange, it is made to equip with the cartridge by which the penetrant remover went into the cartridge holder 42, and the washing sequence over an ink supply system is performed. Since the ink supply system of an ink jet printer 10 of after this washing processing is the same as that of an off, a new condition and a new EQC, i.e., an initial flag, condition, processing after the above-mentioned step S105 is performed. [0068] Furthermore, if cleaning actuation which washes the arm head 22 other than the washing processing at the time of this ink system modification can be performed and predetermined pushing actuation is performed with the manual operation button 32 of the above-mentioned

processing at the time of this ink system modification can be performed and predetermined pushing actuation is performed with the manual operation button 32 of the above-mentioned panel section 30 If the predetermined trigger according to the actuation concerned is outputted and CPU12 receives the trigger concerned The wiping member which CPU12 becomes from elastic plates, such as rubber, after it discharges directions by delivery and it makes the head actuator 16 discharge ink with negative pressure through the above ASIC 13 performs wiping actuation on the front face of head.

[0069] Hereafter, the example of operation performed with this operation gestalt by the above-mentioned configuration and the processing flow is explained. <u>Drawing 12</u> shows the signal outputted when the content and cartridge in ink mode which are memorized by the class and flash memory 14 of the ink with which it filled up in each ink cartridge 43 are removed, and the

counted value in ASIC13 by the timing chart. Suppose that the ink cartridge of the ink of a pigment system, yellow (Y), and a light Magenta (LM) is filled up with the ink of a color system at the ink cartridge of cyanogen (C), a Magenta (M), black (K), and light cyanogen (LC) as an initial state in this example of operation.

[0070] In this condition, if an ink jet printer 10 is booted, processing shown in above-mentioned drawing 6 is performed, and it distinguishes whether an initial flag is ON at step S100, and readout of the ink class in step S105 and distinction in step S110 will be performed noting that an initial flag is not ON. Here, since the thing of a pigment system and the thing of a color system are intermingled, the ink with which the ink cartridge is filled up displays an error message A on the liquid crystal display object 31 in step S115 through distinction of step S110.

[0071] A user grasps that the class of ink is intermingled by checking this error message A by looking, and he equips with the ink cartridge of the yellow with which the ink of a pigment system was filled up, and a light Magenta while he removes the ink cartridge of the above-mentioned yellow and a light Magenta at time of day t1. Consequently, it will distinguish, if the ink of the same class is filled up with step S110 into all ink cartridges, initial restoration to an ink supply system is performed at step S120, and while setting ink mode as a flash memory 14 as a pigment system at step S125, an initial flag is set at step S130.

[0072] Furthermore, the class of ink may be mistaken, when the initial flag is turned on and an ink jet printer 10 is conveyed, and an ink cartridge 43 is once removed and it equips with it again. For example, suppose that it equipped with the ink cartridge 43 into which the ink of a color system was filled up with time of day t2, and the ink jet printer 10 was booted after carrying out the above-mentioned initial restoration.

[0073] In this case, if the initial flag is turned on at step S100, after distinguishing, the purport whose ink mode memorized by the flash memory 14 at step S135 is a pigment system is grasped, the class of ink memorized by cartridge memory 43a at step S140 is read, and the purport which is a color system is grasped. As a result, at step S145, it will be distinguished if both are not in agreement, and an error message B is displayed on the liquid crystal display object 31. [0074] By checking this error message B by looking, a user grasps having mistaken the class of ink and reequips with the ink cartridge 43 into which the ink of a pigment system was filled up with time of day t3. Consequently, it will be distinguished if ink mode and the ink class of ink cartridge with which it is equipped are in agreement at step S145, and printing processing of step S200 is performed. If printing processing is started, the counted value of the amount counter of the ink used of the above ASIC 13 will be cleared by "0" at step S205, a flash memory 14 will be referred to at step S210, and the purport by which ink mode is set as the pigment system will be grasped.

[0075] CPU12 reads the printing conditions which suit the pigment system concerned at step S215 with reference to a flash memory 14 further, and performs printing by the processing after step S220. At this time, the above-mentioned counted value of ASIC13 increases with printing activation. If printing is continued as it is, it will result in printing termination soon, but when a user removes an ink cartridge 43 (this example light Magenta) by a certain reason in the time of day t4 before resulting in printing termination, the above-mentioned control IC41a outputs the signal of a purport with which the ink cartridge was removed.

[0076] Consequently, the printing processing which CPU12 was performing is interrupted and the flow of drawing 8 is performed. That is, an error message C is displayed on the liquid crystal display object 31 at step S305, and when a user checks this error message C by looking, it urges reequipping with an ink cartridge 43. If a user equips with an ink cartridge 43, processing after step S315 will be performed through distinction of step S310, but when it equips with the ink cartridge 43 with which the ink of a color system which is different from other ink cartridges 43 at time of day t5 accidentally was filled up, an error message B is further displayed by processing of step S315 – step S330.

[0077] If it changes into the suitable cartridge by which the ink cartridge 43 was filled up with time of day t6 into pigment system ink when a user checked the error message concerned by looking, a flash memory 14 will be accessed at step S335 through distinction of step S325, and the counter coefficient of a pigment system will be read. And by multiplying the counted value

counted till the above-mentioned time of day t4 at step S340 by the counter coefficient concerned, the amount of the ink used is computed and cartridge memory 43a is updated through the above-mentioned control IC41a at step S345. That is, since an ink residue is updated when it equips with the again proper ink cartridge 43, while the counted value till then is held even if an ink cartridge 43 is removed in the middle of printing, the ink residue memorized by cartridge memory 43a will become proper.

[0078] Thus, in this invention, the class of ink memorized by the class and the above-mentioned nonvolatile memory of the ink which memorized the class of ink and the residue of ink to the nonvolatile memory carried in the ink cartridge, memorized the class of the ink when supplying ink to the ink supply system, and was said-memorized at the time of printing is compared. Consequently, when both are in agreement, printing control which suited the class of the ink concerned can be performed, and mixing of ink can be prevented. Moreover, the amount of the ink used is computed according to head actuation, and since the residue of ink is updated, a proper ink residue can be judged.

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to data medium which recorded the printer control unit, the printer control method, and the printer control program.

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PRIOR ART

[Description of the Prior Art] As a printer which can perform printing according to image quality equivalent to a photograph, an ink jet printer is spreading quickly in recent years. Generally in this ink jet printer, two kinds such as pigment system ink and color system ink are used. With each property, two kinds of this ink has merits and demerits in image quality, lightfastness, etc., and is widely used by both. Moreover, even if it is the case where viscosity differs from density etc. and the two above-mentioned kinds of ink uses the same arm head, in order to perform suitable printing, making it correspond to said property, control conditions, such as discharge quantity of ink and regurgitation timing, differ in pigment system ink and color system ink, respectively.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to invention which starts claim 1, claim 11, and claim 21 as explained above, mixing of ink can be prevented, and data medium which recorded the printer control unit which can perform suitable control according to the class of ink, the printer control method, and the printer control program can be offered.

[0031] Moreover, according to invention concerning claim 2, claim 12, and claim 22, the proper ink residue in an ink cartridge can be judged. Furthermore, according to invention concerning claim 3, claim 13, and claim 23, the amount of the ink used is easily computable. Furthermore, according to invention concerning claim 4, claim 14, and claim 24, the configuration for computing the amount used for every class of ink can be realized easily, and the amount used can be easily obtained from counted value. Furthermore, according to invention concerning claim 5, claim 15, and claim 25, printing according to the class of ink can be performed easily.

[0032] Furthermore, according to invention concerning claim 6, claim 16, and claim 26, it can clean the condition for every class of ink. Furthermore, according to invention concerning claim 7, claim 17, and claim 27, Flushing can be performed the condition for every class of ink. Furthermore, according to invention concerning claim 8, claim 18, and claim 28, when the power supply of a printer is turned off suddenly, mixing of ink can be prevented after re-powering on, an ink residue can be judged appropriately, and head actuation for every class of ink can be performed exactly. Furthermore, according to invention concerning claim 9, claim 19, and claim 29, mixing of ink can be prevented certainly. Furthermore, according to invention concerning claim 10, claim 20, and claim 30, mixing of ink can be prevented certainly.

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing. Drawing 1 is the outline perspective diagram showing the internal configuration of the ink jet printer carrying the printer control unit concerning 1 operation gestalt of this invention, and drawing 2 is the block diagram showing the connection condition of each hardware of the ink jet printer concerned. In drawing, it has the Maine substrate 11 and the printing section 20, the panel section 30, and the cartridge section 40 are connected to the Maine substrate 11, and an ink jet printer 10 functions as a printer, when CPU12 which it had on the Maine substrate 11 controls each part.

[0034] On the Maine substrate 11, it has others, ASIC13, a flash memory 14, and the head actuator 16. [above / CPU 12] ASIC13 is IC customized since the arm head 22 mentioned later was driven, and it performs processing for head 22 actuation, transmitting and receiving the above CPU 12 and a predetermined signal. As one of the processing of this, it has the amount counter of the ink used, and the number of dots printed is counted for every ink color. In addition, the applied-voltage data to the head actuator 16 which mentions later is outputted. The head actuator 16 generates the applied-voltage pattern to the piezo-electric element built in the arm head 22 which is the circuit which consists of Dedication IC, a transistor for actuation, a heat sink, etc., and is mentioned later.

[0035] A flash memory 14 is EEPROM which can eliminate the content of storage electrically, and can eliminate data per a chip package or block. Furthermore, the flash memory 14 concerning this operation gestalt is a boot block mold, and can forbid the store and elimination of

hardware-data to a predetermined block.

[0036] The printing section 20 is mainly equipped with the roller 21 and the arm head 22, and the arm head 22 is connected with the above-mentioned Maine substrate 11 through the predetermined trunk cable. Rotating by the motor which is driven by the motor control section which is not illustrated and which is not illustrated, the roller 21 is constituted so that a print sheet may be sent. while the arm head 22 is carried in the carriage which is not illustrated and this carriage makes an arm head 22 arrange near the periphery of the above-mentioned roller 21 -- an arm head 22 -- the shaft orientations of a roller 21 -- a round trip -- it is made movable. [0037] Tube 22a of each ink color exception is connected to the arm head 22, and supply of each color ink is received. Moreover, the arm head 22 is equipped with the piezo-electric element which is not illustrated, and when a piezo-electric element drives at the ink room which is open for free passage from above-mentioned tube 22a to a delivery, the regurgitation of the ink is carried out per dot. The wiring on a predetermined trunk cable and a substrate connects, and this head actuator 16 impresses this generation voltage to an arm head 22 while generating predetermined voltage according to the command from the above ASIC 13, and as for an arm head 22 and the head actuator 16, it drives the above-mentioned carriage and a piezo-electric element.

[0038] The panel section 30 is equipped with the liquid crystal display object 31 and the manual operation button 32, and the panel section 30 is connected with the above—mentioned Maine substrate 11 by the predetermined trunk cable through panel I/O33. The liquid crystal display object 31 is a display which displays an alphabetic character etc. based on the predetermined signal transmitted from CPU12, and can display an error message, the status, etc. A manual operation button 32 is a carbon button used in case a user and a serviceman operate an ink jet printer 10, and by independent carbon button pushing actuation or two or more carbon button pushing actuation, the above CPU 12 distinguishes the content of actuation, and can direct now ON/OFF of a power supply, blowdown of print data, discharge of an error message, activation of the ink message exchange, activation of cleaning, etc.

[0039] The cartridge section is mainly equipped with the sub substrate 41, the cartridge holder 42, and the ink cartridge 43. The ink jet printer 10 concerning this operation gestalt uses cyanogen, a Magenta, yellow, light cyanogen, a light Magenta, and six colors of black, and fills up an ink cartridge 43 with each ink. The ink cartridge carries cartridge memory 43a, and the class of ink and the residue of ink with which it fills up are memorized by this cartridge memory 43a. Here, the data in which it is shown whether it is color system ink as a class of ink or it is pigment system ink is recorded. That is, this cartridge memory 43a constitutes the abovementioned nonvolatile memory. Each cartridge holder 42 is equipped with contact section 42a with cartridge memory 43a, if the cartridge holder 42 is equipped with an ink cartridge 43, will contact cartridge memory 43a and will secure the connection for data transmission and reception. Moreover, the above-mentioned cartridge holder 42 is equipped with the ink supply needle which is not illustrated, if equipped with an ink cartridge 43, will contact the ink feed hopper with which this ink cartridge 43 is equipped and which is not illustrated, and will form the supply path of ink. The ink with which tube 22a was attached in the cartridge holder 42, and it filled up in the ink cartridge 43 through this tube 22a is supplied to the above-mentioned arm head 22.

[0040] It is carried in an ink jet printer 10 by equipping the cartridge holder 42 with each ink cartridge 43, and where the cartridge holder 42 is equipped, while ink supply is attained through the above-mentioned tube 22a, transmission and reception of data of the above-mentioned cartridge memory 43a are attained. That is, the predetermined trunk cable 40 is connected to the cartridge holder 42, and where the cartridge holder 42 is equipped with an ink cartridge 43, the communication line of the trunk cable 40 concerned and cartridge memory 43a is secured. Thus, in this operation gestalt, the cartridge holder 42 constitutes the above-mentioned applied part.

[0041] The above-mentioned cartridge memory 43a is controlled by transmitting and receiving a predetermined signal from control IC41a which the trunk cable 40 connected to the cartridge holder 42 was connected to the sub substrate 41, and was carried on this sub substrate 41. The

sub substrate 41 is connected to the above-mentioned Maine substrate 11 through the further predetermined trunk cable. The above-mentioned control IC41a is IC carried in order to control using two or more ink, i.e., two or more cartridge memory 43a, and performs read-out of the class of ink recorded on cartridge memory 43a, renewal of an ink residue; etc. by CPU12 on the Maine substrate transmitting and receiving a predetermined signal, and performing control IC41a and a communication link. Moreover, in this operation gestalt, in order to distinguish whether attachment and detachment of an ink cartridge 43 were performed, when the above-mentioned control IC41a outputs the signal which shows removal of an ink cartridge 43 when an ink cartridge 43 is removed from the cartridge holder 42 and it is equipped with an ink cartridge 43, the above-mentioned control IC41a outputs the signal which shows wearing of an ink cartridge 43.

[0042] On the above-mentioned Maine substrate 11, it has further predetermined communication link I/O15, and connects with the computer 50 of the exterior of an ink jet printer 10 through this communication link I/O15. If the driver for this ink jet printer 10 is installed in the computer 50 and a user performs printing of digital photograph data, while a driver will perform predetermined data conversion etc., print data and printing directions are transmitted to an ink jet printer 10, and the above CPU 12 prints print data according to printing directions. [0043] Drawing 3 shows the important section of the memory map of a flash memory 14. Since the both sides of the ink of a color system and the ink of a pigment system are usable, in order that they may perform suitable control to the ink of both systems in a flash memory 14, as for the ink jet printer 10 concerning this operation gestalt, the parameter according to system of ink etc. is memorized. The initial flag which shows whether initial restoration filled up with predetermined ink in an ink supply system, i.e., the above-mentioned tube 22a, was specifically performed, and the ink mode which shows the class of ink current in use are memorized. [0044] Furthermore, the printing conditions which are an actuation parameter according to class of ink are memorized to each of the ink of a pigment system, and the ink of a color system. These data is memorized by the protection block which can forbid the store and elimination of hardware-data. Thus, in this operation gestalt, a flash memory 14 constitutes the abovementioned supply ink storage means and a printing condition storage means. There are a counter coefficient, driver voltage, cleaning conditions, and the Flushing conditions as printing conditions, and a counter coefficient is a coefficient by which the counted value in the above ASIC 13 is multiplied, and computes appropriately the amount of the ink used of both a pigment system and a color system from a unified count which is called the number of dots by the multiplication concerned. Moreover, since the ink of a pigment system differs from the ink of a color system, the property, i.e., the viscosity etc., of ink etc., though same actuation of the regurgitation of ink, cleaning, Flushing, etc. is carried out, concrete actuation of an arm head 22 differs. [0045] Then, driver voltage, cleaning conditions, and the Flushing conditions are memorized for every system, and CPU12 reads this data and directs it to the above ASIC 13, and when the head actuator 16 carries out predetermined head actuation according to the directions concerned, suitable control is performed to the ink of both systems. For example, driver voltage is data in which the pattern of the applied voltage generated in the above-mentioned head actuator 16 at the time of printing is shown, and impresses voltage by pattern which is different as shown in drawing 4.

[0046] That is, if the driver voltage as printing conditions consists of a look-up table which indicated timer data and CPU12 directs to ASIC13 with reference to this lookup data, ASIC13 will change the timer data concerned and will output applied-voltage data to the head actuator 16. The head actuator 16 generates the pulse which is the temporal response of voltage with said applied-voltage data. While a pulse mainly has a lifting pulse and a downward pulse and applied voltage rises in a lifting pulse, the above-mentioned piezo-electric element drives, and the capacity of an ink room decreases. Moreover, while applied voltage descends in a downward pulse, the above-mentioned piezo-electric element drives, and the capacity of an ink room increases. Therefore, by adjusting the width of face of these pulses, the voltage which the above-mentioned head actuator 16 generates becomes abbreviation trapezoidal shape as shown in drawing 4, and the regurgitation of ink is controlled by this voltage.

[0047] The voltage pattern of this <u>drawing 4</u> upside is the thing of a pigment system, inputs a downward pulse in a period t11 first, and makes the capacity of an ink room increase in the ink of the pigment system concerned. And after falling and making the condition of ink attach by suspending the input of a pulse in a period t12, and holding a piezo-electric element, a lifting pulse is inputted, the capacity of an ink room is decreased, and ink is made to breathe out in a period t13. Furthermore, the input of a pulse is suspended in a period t14, this condition is held, a downward pulse is inputted in a period t15, and regurgitation ink is divided. Then, while suspending the input of a pulse in a period t16 and carrying out fixed period maintenance of this condition, carriage is driven and the ink regurgitation sequence over the following dot is performed.

[0048] On the other hand, the voltage pattern of the <u>drawing 4</u> bottom is the thing of a color system, in the ink of the color system concerned, inputs a lifting pulse in a period t21 first, and decreases the capacity of an ink room. And after falling and making the condition of ink attach by suspending the input of a pulse in a period t22, and holding a piezo-electric element, this condition is held in a period t24, it falls and the condition of ink is made to input a downward pulse, to make the capacity of an ink room increase, and to attach in a period t23. Furthermore, a lifting pulse is inputted again, the capacity of an ink room is decreased, and ink is made to breathe out in a period t25. This condition is held in next in a period t26, a downward pulse is inputted into it in a period t27, regurgitation ink is divided, this condition is held in a period t28, and the regurgitation sequence of 1 dot is ended.

[0049] Thus, in the ink of a pigment system, and the ink of a color system, head actuation patterns also differ from the difference in an ink property, in order to perform control suitable for each system, driver voltage is held according to the ink system, and according to the class of ink, it is referred to suitably. Besides the driver voltage at the time of this printing, it is generable [the head actuator 16 / the voltage for cleaning or Flushing], and an arm head 22 can perform the regurgitation of the ink which is unrelated to printing with the voltage concerned. That is, on the other hand, the pump unit 24 is arranged directly under the edge, and attraction of thickening ink and initial restoration processing to tube 22a can be performed by making negative pressure act to the arm head 22 of a reciprocating motion of an arm head 22 conveyed to this pump—unit location.

[0050] The head actuator 16 impresses predetermined driver voltage to a pump unit 24 through the cable which is not illustrated. If fixed time amount passes during printing, the Flushing conditions according to the class of ink will be referred to. An arm head 22 is made to perform the predetermined ink regurgitation, and while referring to the cleaning conditions according to an ink class according to the predetermined actuation in the above-mentioned manual operation button 32, predetermined cleaning actuation can be performed on an arm head 22. Furthermore, after exchange of an ink cartridge, initial restoration processing to tube 22a is performed.

[0051] Drawing 5 is the schematic diagram having shown the outline of the control which the printer control unit applied to this invention in the above-mentioned configuration carries out. In order for the above CPU 12 to bear the main control in the printer control unit and to perform processing according to the class of ink, CPU12 compares the ink mode memorized by the class and flash memory 14 of the ink memorized by the above-mentioned cartridge memory 43a. It prints in the condition of having made in agreement the class of ink in which under the current activity memorized as ink mode (i.e., an ink supply system) is filled up with ink, and the class of ink with which the ink cartridge 43 is filled up.

[0052] Moreover, since an arm head 22 is driven on the conditions which suited the class of ink it was presupposed that it was in agreement of ink with these comparisons, with reference to a flash memory 14, an arm head 22 is driven using the parameter of pigment system control or color system control according to the class of ink current in use. Furthermore, by updating it from the ink residue of the above-mentioned cartridge memory 43a, as the amount used concerned is reduced, while computing the amount of the ink used by multiplying the number of dots counted by ASIC13 by the counter coefficient according to the class of ink, even if it is pigment system ink and is color system ink, the ink residue is memorized to accuracy. Thus, in this operation gestalt, CPU12, ASIC13, the head actuator 16, and control IC41a constitute the

above-mentioned head actuation control means.

[0053] Drawing 6 -8 show the flow chart of the processing which CPU12 performs with an ink jet printer 10 including the above control. Drawing 6 is processing performed after boot of an ink jet printer 10, and CPU12 distinguishes whether the above-mentioned initial flag is ON with reference to a flash memory 14 at step S100. Processing for being filled up with ink in the tube 22a concerned is performed noting that ink supply systems, such as above-mentioned tube 22a, are not filled up with ink, when it is not distinguished at this step S100 that an initial flag is ON. [0054] At this time, in step S105, CPU12 performs the above-mentioned control IC41a and a communication link, carries out reading appearance of the ink class of cartridge memory 43a to this control IC41a, and grasps the class of ink of six colors each. At step S110, it distinguishes whether the class of this read ink is the same class also as six colors, when it is not distinguished that it is the same class, the panel section 30 is controlled by step S115 through above-mentioned panel I/O33, and the error message A shown in the liquid crystal display object 31 at drawing 9 is displayed.

[0055] An error message A is a message "six colors of cartridges are not unified", and the processing after the above-mentioned step S105 is repeated, urging exchanging the ink cartridge 43 which the user was mistaken in and was inserted where the message concerned is displayed to a proper thing. When the class of ink is distinguished at the above-mentioned step S110 as it is the same class also as six colors, restoration processing of ink to an ink supply system is performed at step S120. The restoration processing concerned is a special sequence which makes an ink supply system fill up with ink, after this sequence is performed, an ink supply system is filled up with the ink in an ink cartridge, and the ink interior of a room of an arm head 22 is also filled up with ink. Therefore, if the piezo-electric element in an arm head 22 is driven in this condition, ink will be breathed out from the nozzle of an arm head 22.

[0056] After this restoration processing, the class of ink which accessed the above-mentioned flash memory 14 at step S125, and carried out [above-mentioned] restoration is set up as ink mode. Furthermore, the above-mentioned flash memory 14 is accessed at step S130, and the above-mentioned initial flag is set. When it is distinguished at the case where such restoration processing is performed, and the above-mentioned step S100 that an initial flag is ON, while accessing the above-mentioned flash memory 14 at step S135 and reading the above-mentioned ink mode, reading appearance of the ink class of cartridge memory 43a is carried out to the above-mentioned control IC41a at step S140, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped.

[0057] And it distinguishes whether the ink mode memorized by the class and flash memory 14 of the ink filled up with step S145 into the ink cartridge 43 is in agreement. When both were in agreement at step S145 and it is distinguished, printing processing is performed at step S200. If both are in agreement at step S145, when not being distinguished, the panel section 30 is controlled by step S150 through above-mentioned panel I/O33, and the error message B shown in the liquid crystal display object 31 at drawing 10 is displayed.

[0058] An error message B is a message of "being equipped with the ink in which ink modes differ", and the processing after the above-mentioned step S140 is repeated, urging exchanging the ink cartridge 43 which the user was mistaken in and was inserted where the message concerned is displayed to a proper thing. Processing which is standing by and shows that print-data transmission is carried out with printing directions from the above-mentioned computer 50 in printing processing of step S200 to drawing 7 after printing directions is performed.

[0059] At step S205, the above ASIC 13 is accessed, a counter is cleared to "0" at the amount step S210 of the ink used in this ASIC13, reading appearance of the ink class of cartridge memory 43a is carried out to the above-mentioned control IC41a at step S210, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped. And a flash memory 14 is accessed at step S215, and the printing conditions which suited the class of the ink concerned are read.

[0060] Printing is performed driving a part for a predetermined line based on the print data transmitted from the above-mentioned computer 50 after step S220. At step S220, with reference to the driver voltage of the printing conditions which suited the class of the above-

mentioned ink, a command is transmitted to the above ASIC 13, and an arm head 22 is driven by making the head actuator 16 output the above-mentioned pulse. Thus, an arm head 22 is driven, and at step S225, the count is performed by ASIC13, moving an arm head 22 by carriage and performing printing.

[0061] after printing for a predetermined line is completed, reading appearance of the counter coefficient which accessed the flash memory 14 at step S230, and suited the class of ink is carried out, and the amount of the ink used is computed by multiplying by the counter coefficient concerned which carried out reading appearance and the counted value of the above ASIC 13 at step S235. As the amount of the ink used which computed the command at this step S235 from delivery and the ink residue memorized at cartridge memory 43a is reduced to the abovementioned control IC41a, it is made to update the ink residue concerned at step S240. In step S245, the above ASIC 13 is accessed and a counter is again cleared to "0" at the amount step S210 of the ink used in this ASIC13.

[0062] And the processing after the above-mentioned step S220 is repeated until it distinguishes that it was finished whether printing all the print data transmitted from the abovementioned computer 50 in step S250 and having finished printing is distinguished. In addition, in one end position of a reciprocating motion according [the above-mentioned arm head 22] to carriage, Flushing is made with this operation gestalt. That is, after fixed time amount passes during printing, an arm head 22 is conveyed even to the Flushing field, and Flushing is performed, reading the Flushing conditions which suit the class of ink read from the flash memory 14 at the above-mentioned step S210. Moreover, when an ink cartridge 43 is removed in this operation gestalt, in order to prevent continuing performing printing, when the signal which control IC41a outputs when the above-mentioned ink cartridge 43 is removed is detected, processing which interrupts processing of steps S205-S250 of drawing 7, and is shown in drawing 8 is performed. [0063] If the signal which shows that the ink cartridge 43 was removed is detected, the panel section 30 will be controlled by step S305 through above-mentioned panel I/O33, and the error message C shown in the liquid crystal display object 31 at drawing 11 will be displayed. An error message C is a message "equip with a cartridge", and the processing after the above-mentioned step S305 is repeated until the signal which shows that it equipped with the ink cartridge 43 at step S310 is detected a user urging equipping with an ink cartridge 43 where the message concerned is displayed. If the signal which shows that it equipped with the ink cartridge 43 at step S310 is detected, while accessing the above-mentioned flash memory 14 at step S315 and reading the above-mentioned ink mode, reading appearance of the ink class of cartridge memory 43a is carried out to the above-mentioned control IC41a at step S320, and the class of ink with which the ink cartridge 43 with which it is equipped was filled up is grasped. [0064] And it distinguishes whether the ink mode memorized by the class and flash memory 14 of the ink filled up with step S325 into the ink cartridge 43 is in agreement. If both are in agreement at step S325, when not being distinguished, the panel section 30 is controlled by step S330 through above-mentioned panel I/O33, and the error message B shown in the liquid crystal display object 31 at drawing 10 is displayed. when both were in agreement at step S325 and it is distinguished, reading appearance of the counter coefficient which accessed the flash memory 14 at step S325, and suited the class of ink is carried out, and the amount of the ink used is computed by multiplying by the counted value currently held at step S340 by the counter

coefficient which carried out reading appearance and Above ASIC 13 concerned. [0065] As the amount of the ink used which computed the command at this step S340 from delivery and the ink residue memorized at cartridge memory 43a is reduced to the above—mentioned control IC41a, it is made to update the ink residue concerned at step S345. That is, after the restoration ink of an ink cartridge 43 with which it is re-equipped judges whether it is the right, an ink residue is updated based on the counted value counted until the cartridge was extracted. Therefore, even if it is the case where an ink cartridge 43 is in the middle of printing, and is removed, it becomes a right ink residue. Then, it returns to the printing processing shown in above—mentioned drawing 7.

[0066] Furthermore, in this operation gestalt, it is usable in the both sides of the ink of a pigment system, and the ink of a color system, and the class of the ink concerned can be changed. On

the occasion of exchange of an ink system, if the ink of both systems is mixed, in a print, it will not become suitable coloring, and various inconvenience arises from the actuation patterns of head 22 grade differing. Therefore, on the occasion of exchange of an ink system, it is necessary to also carry out washing of the above-mentioned ink supply system. When a user or a serviceman performs predetermined pushing actuation with the manual operation button 32 of the above-mentioned panel section 30, it is possible to carry out the message exchange of ink. [0067] That is, if predetermined pushing actuation is performed in the above-mentioned manual operation button 32, the predetermined trigger according to the actuation concerned will be outputted, and if CPU12 receives the trigger concerned, even if printing will perform, the message exchange shown in step S400 of drawing 6 is performed. Expressing a predetermined guidance message on the liquid crystal display object 31 of the above-mentioned panel section 30 as step S410 in this message exchange, it is made to equip with the cartridge by which the penetrant remover went into the cartridge holder 42, and the washing sequence over an ink supply system is performed. Since the ink supply system of an ink jet printer 10 of after this washing processing is the same as that of an off, a new condition and a new EQC, i.e., an initial flag, condition, processing after the above-mentioned step S105 is performed.

[0068] Furthermore, if cleaning actuation which washes the arm head 22 other than the washing processing at the time of this ink system modification can be performed and predetermined pushing actuation is performed with the manual operation button 32 of the above-mentioned panel section 30 If the predetermined trigger according to the actuation concerned is outputted and CPU12 receives the trigger concerned The wiping member which CPU12 becomes from elastic plates, such as rubber, after it discharges directions by delivery and it makes the head actuator 16 discharge ink with negative pressure through the above ASIC 13 performs wiping actuation on the front face of head.

[0069] Hereafter, the example of operation performed with this operation gestalt by the above-mentioned configuration and the processing flow is explained. <u>Drawing 12</u> shows the signal outputted when the content and cartridge in ink mode which are memorized by the class and flash memory 14 of the ink with which it filled up in each ink cartridge 43 are removed, and the counted value in ASIC13 by the timing chart. Suppose that the ink cartridge of the ink of a pigment system, yellow (Y), and a light Magenta (LM) is filled up with the ink of a color system at the ink cartridge of cyanogen (C), a Magenta (M), black (K), and light cyanogen (LC) as an initial state in this example of operation.

[0070] In this condition, if an ink jet printer 10 is booted, processing shown in above-mentioned drawing 6 is performed, and it distinguishes whether an initial flag is ON at step S100, and readout of the ink class in step S105 and distinction in step S110 will be performed noting that an initial flag is not ON. Here, since the thing of a pigment system and the thing of a color system are intermingled, the ink with which the ink cartridge is filled up displays an error message A on the liquid crystal display object 31 in step S115 through distinction of step S110.

[0071] A user grasps that the class of ink is intermingled by checking this error message A by looking, and he equips with the ink cartridge of the yellow with which the ink of a pigment system was filled up, and a light Magenta while he removes the ink cartridge of the above-mentioned yellow and a light Magenta at time of day t1. Consequently, it will distinguish, if the ink of the same class is filled up with step S110 into all ink cartridges, initial restoration to an ink supply system is performed at step S120, and while setting ink mode as a flash memory 14 as a pigment system at step S125, an initial flag is set at step S130.

[0072] Furthermore, the class of ink may be mistaken, when the initial flag is turned on and an ink jet printer 10 is conveyed, and an ink cartridge 43 is once removed and it equips with it again. For example, suppose that it equipped with the ink cartridge 43 into which the ink of a color system was filled up with time of day t2, and the ink jet printer 10 was booted after carrying out the above-mentioned initial restoration.

[0073] In this case, if the initial flag is turned on at step S100, after distinguishing, the purport whose ink mode memorized by the flash memory 14 at step S135 is a pigment system is grasped, the class of ink memorized by cartridge memory 43a at step S140 is read, and the purport which is a color system is grasped. As a result, at step S145, it will be distinguished if both are not in

agreement, and an error message B is displayed on the liquid crystal display object 31. [0074] By checking this error message B by looking, a user grasps having mistaken the class of ink and reequips with the ink cartridge 43 into which the ink of a pigment system was filled up with time of day t3. Consequently, it will be distinguished if ink mode and the ink class of ink cartridge with which it is equipped are in agreement at step S145, and printing processing of step S200 is performed. If printing processing is started, the counted value of the amount counter of the ink used of the above ASIC 13 will be cleared by "0" at step S205, a flash memory 14 will be referred to at step S210, and the purport by which ink mode is set as the pigment system will be grasped.

[0075] CPU12 reads the printing conditions which suit the pigment system concerned at step S215 with reference to a flash memory 14 further, and performs printing by the processing after step S220. At this time, the above-mentioned counted value of ASIC13 increases with printing activation. If printing is continued as it is, it will result in printing termination soon, but when a user removes an ink cartridge 43 (this example light Magenta) by a certain reason in the time of day t4 before resulting in printing termination, the above-mentioned control IC41a outputs the signal of a purport with which the ink cartridge was removed.

[0076] Consequently, the printing processing which CPU12 was performing is interrupted and the flow of <u>drawing 8</u> is performed. That is, an error message C is displayed on the liquid crystal display object 31 at step S305, and when a user checks this error message C by looking, it urges reequipping with an ink cartridge 43. If a user equips with an ink cartridge 43, processing after step S315 will be performed through distinction of step S310, but when it equips with the ink cartridge 43 with which the ink of a color system which is different from other ink cartridges 43 at time of day t5 accidentally was filled up, an error message B is further displayed by processing of step S315 – step S330.

[0077] If it changes into the suitable cartridge by which the ink cartridge 43 was filled up with time of day t6 into pigment system ink when a user checked the error message concerned by looking, a flash memory 14 will be accessed at step S335 through distinction of step S325, and the counter coefficient of a pigment system will be read. And by multiplying the counted value counted till the above-mentioned time of day t4 at step S340 by the counter coefficient concerned, the amount of the ink used is computed and cartridge memory 43a is updated through the above-mentioned control IC41a at step S345. That is, since an ink residue is updated when it equips with the again proper ink cartridge 43, while the counted value till then is held even if an ink cartridge 43 is removed in the middle of printing, the ink residue memorized by cartridge memory 43a will become proper.

[0078] Thus, in this invention, the class of ink memorized by the class and the above-mentioned nonvolatile memory of the ink which memorized the class of ink and the residue of ink to the nonvolatile memory carried in the ink cartridge, memorized the class of the ink when supplying ink to the ink supply system, and was said-memorized at the time of printing is compared. Consequently, when both are in agreement, printing control which suited the class of the ink concerned can be performed, and mixing of ink can be prevented. Moreover, the amount of the ink used is computed according to head actuation, and since the residue of ink is updated, a proper ink residue can be judged.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The following technical problems occurred in the conventional ink jet printer mentioned above. That is, wearing of the ink cartridge of a class which makes a mistake in two kinds of ink, and is different before carrying out exchange and washing of an ink supply system also in an usable printer will mix the ink of a different system inside an ink supply system. Since it becomes impossible to perform discharge quantity control according to the property of ink etc. when two kinds of ink has been mixed, printing quality is spoiled. Therefore, in order to exchange the two above—mentioned kinds of ink and to prevent mixing of the ink in an ink supply system in an usable ink jet printer, exchange and washing of an ink supply system are needed at the time of exchange of an ink class.

[0004] Furthermore, although the residue of the ink with which the ink cartridge is filled up in the ink jet printer may be supervised and it may display as the status Before exhausting ink in the conventional ink jet printer mentioned above, from an exchangeable thing, an ink cartridge in pigment system ink and color system ink When the class of ink was changed and the class of ink was returned further once again after using ink to the middle, there was a problem that the ink residue of the original cartridge could not be judged correctly.

[0005] This invention was made in view of the above-mentioned technical problem, and even if it changes an ink cartridge what times, it aims at offering the printer control unit which can judge an ink residue correctly, the printer control method, and a printer control unit, while carrying out proper control according to an ink class, preventing mixing of the ink of a different system in the printer which can exchange an ink class.

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MEANS

[Means for Solving the Problem] Invention which starts claim 1 in order to attain the above—mentioned object is constituted so that a printer which prints while supplying ink with which an exchangeable ink cartridge was filled up to an arm head may be controlled, and it is controlled, preventing mixing of an ink class. For this reason, nonvolatile memory which can update the content of storage is carried in an exchangeable ink cartridge, and a class of ink with which an ink cartridge is filled up is memorized by this nonvolatile memory. This ink cartridge is detached and attached through an ink cartridge applied part by main part of a printer, and data transmission and reception from the above—mentioned nonvolatile memory are possible for it at the time of wearing.

[0007] Furthermore, a class of ink currently supplied to an ink supply system which consists of ink supply tubes from an ink cartridge to an arm head etc. is memorized by supply ink storage means, and printing conditions required for actuation of an arm head are memorized by printing condition storage means according to a class of ink. A head actuation control means uses such storage information in printing, and compares a class of ink memorized by a class of ink and the above-mentioned supply ink storage means which were memorized by nonvolatile memory. And actuation of an arm head is controlled based on printing conditions which drive an arm head in the condition that a class of both ink is in agreement, and suit this ink class in agreement. [0008] Namely, a class of ink memorized by the above-mentioned nonvolatile memory is uniquely in agreement with a class of ink with which an ink cartridge was filled up. Since a class of ink memorized by supply ink storage means is uniquely in agreement with a class of ink currently supplied to an ink supply system When a head actuation control means compares these, it can prevent driving an arm head using an ink cartridge of a class of different ink from a class of ink already supplied to an ink supply system, and mixing of ink can be prevented. [0009] Here, updating of the content of storage is possible for it, and if the above-mentioned nonvolatile memory is nonvolatile, can adopt good various modes and is constituted from EEPROMs, such as a flash memory, it is suitable. Moreover, although what is necessary is just to memorize whether a class of ink is the thing of whether restoration ink is the thing of a color system as information which is used in order to prevent mixing of ink as mentioned above, and for that shows a class of ink, and a pigment system, it is possible to memorize various information in addition to this as a class of ink. That is, by referring to the restoration day concerned, if a restoration day of ink is memorized, it can constitute so that ink over which the expiration date passed may not be used. Moreover, even if it is ink of a same system, actuation of an arm head is controllable by the best actuation sequence over the ink by memorizing information which shows a purport from which a component differs.

[0010] It is removable in an ink cartridge, and the ink cartridge attachment—and—detachment section equips a holder of a fitting type with a container which has capacity which can be filled up with ink that what is necessary is just to be able to enable data transmission and reception from nonvolatile memory at the time of ink cartridge wearing, and a configuration which secures a flow of a terminal of nonvolatile memory to fitting concerned and coincidence is possible for it. It can constitute from rewritable various memory that what is necessary is just to be able to memorize a class of ink currently supplied to an ink supply system in a supply ink storage means.

Although RAM etc. can constitute, if a printer is frequently constituted from EEPROMs, such as a flash memory, a place whose power supply is what is turned on / turned off, it is suitable. [0011] It can constitute from various memory that what is necessary is just to be able to memorize according to a class of ink filled up with printing conditions required for actuation of an arm head by the above-mentioned ink cartridge in a printing condition storage means. Although a mask ROM etc. can also constitute, the status changes with activities serially, and since it is the mode which can change activity ink, if especially this invention is constituted from EEPROMs, such as a rewritable flash memory, it is suitable [this invention] for a printer. If a head control driving means is constituted from a CPU etc., it is [that what is necessary is to read and calculate information from various memory etc. and just to be able to control memory, an arm head, etc.] suitable.

[0012] As a configuration for controlling to be able to judge an ink residue correctly, furthermore, invention according to claim 2 In a printer control unit given in above-mentioned claim 1 the above-mentioned nonvolatile memory A residue of ink with which an ink cartridge is filled up is memorized, and the above-mentioned head actuation control means is considered as a configuration which updates a residue of ink memorized by the above-mentioned nonvolatile memory based on the calculation concerned while it computes the amount of ink used consumed with actuation of the above-mentioned arm head.

[0013] That is, since a residue of ink is updated with actuation of a printer, it becomes the residue of proper ink. Since a residue of ink is memorized by nonvolatile memory carried in the ink cartridge itself, it removes, before consuming ink with which it filled up, other ink cartridges are used, and an ink residue will become proper even if it uses an ink cartridge removed again. of course — even if it uses it, removing an ink cartridge and making other printers equip — being concerned — others — if a printer control unit which requires a printer for this invention is provided, it will become a proper ink residue.

[0014] Moreover, the technique of computing the amount of ink used by head actuation control means is various, and invention according to claim 3 is considered as a configuration which computes the amount of the ink used based on a counter which the above-mentioned head actuation control means increases with actuation of the above-mentioned arm head in a printer control unit given in above-mentioned claim 2 as an example of a configuration for it. That is, since an arm head drives at the time of printing, if a counter which counted value increases with actuation of the arm head concerned is used, based on the counted value concerned, the amount used is easily computable. The technique of more specifically counting the number of dots which carries out the regurgitation by arm head is employable. What is necessary is just to compute the amount used for every class of ink based on the number of dots, although the amount used may change with classes of ink also with the same number of dots since a class of ink can be changed in this invention. Thus, when computing the amount of ink used based on counted value, especially this count should just form a single counter, without distinguishing according to a class of ink.

[0015] As an example of printing conditions which various conditions exist as printing conditions required for actuation of the above-mentioned arm head, and need to be memorized according to a class of ink, furthermore, invention according to claim 4 In a printer control unit given in above-mentioned claim 3, the above-mentioned printing condition storage means is considered as a configuration which memorizes the amount calculation coefficient of the ink used for computing the amount of the ink used by taking an advantage at counted value of the above-mentioned counter.

[0016] That is, since above-mentioned counted value and the amount of ink used are usually in proportionality, if the amount calculation coefficient of the ink used which computes the amount of the ink used by taking the advantage of counted value is prepared, the amount used can be easily obtained from counted value only by 1 time of multiplication. Moreover, it can constitute very easily [that the amount coefficient of the ink used for every class of ink may only be memorized], and in order to compute the amount used for every class of ink, also when it is necessary to correspond to ink in which a class of ink increases or properties differ, it can respond easily.

[0017] Furthermore, invention according to claim 5 is considered as a configuration which memorizes a driver voltage pattern impressed in case the above-mentioned printing condition storage means drives the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 4 as other examples of printing conditions which need to be memorized according to a class of ink. That is, when classes of ink differ like ink of a pigment system, and ink of a color system, conditions which drive an arm head differ. For example, if the above-mentioned ink classes differ in the case of a printer which controls discharge quantity, regurgitation timing, etc. of ink by telescopic motion of a piezo-electric element etc., 1 time of ink discharge quantity differs from regurgitation timing etc. Since it is controlled by changing a driver voltage pattern impressed to an arm head, such discharge quantity etc. can perform printing according to a class of ink easily, if a driver voltage pattern is memorized according to a class of ink as printing conditions.

[0018] Furthermore, invention according to claim 6 is considered as a configuration which memorizes actuation conditions which the above-mentioned printing condition storage means needs for cleaning of an ink supply system in the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 5 as other examples of printing conditions which need to be memorized according to a class of ink. Namely, since an ink supply system may be cleaned, ink is once discharged in this case and wiping etc. is carried out when a case where a printer is not used for a long time, and printing quality have deteriorated, in order to make blowdown perform exactly, it is necessary to drive an arm head a condition for every class of ink, and, in such a case, can respond.

[0019] Furthermore, since a class of ink can be exchanged in this invention, it is necessary to also wash an ink supply system from a cartridge to an arm head on the occasion of exchange, and when performing this washing sequence, in order to make ink of an ink supply system discharge exactly, it is necessary to drive an arm head a condition for every class of ink, and, also in such a case, can respond.

[0020] Furthermore, invention according to claim 7 is considered as a configuration which memorizes actuation conditions which the above-mentioned printing condition storage means needs for Flushing in the above-mentioned arm head in a printer control unit given in either above-mentioned claim 1 - claim 6 as other examples of printing conditions which need to be memorized according to a class of ink. Namely, although Flushing may be performed in order to carry out regurgitation blowdown of the color mixture ink which flowed backwards from a nozzle by wiping or to prevent blinding by thickening of ink, from it being what should be determined with the property of an ink class, timing which performs this Flushing, and a regurgitation discharge at the time of Flushing need to drive an arm head a condition for every class of ink, in order to perform Flushing exactly, and, in such a case, can respond.

[0021] Furthermore, when a power supply of a printer is turned off suddenly, mixing of ink is prevented after re-powering on. As an example for judging an ink residue appropriately and constituting it possible [activation of head actuation for every class of ink] exactly, invention according to claim 8 In a printer control unit given in either above-mentioned claim 1 - claim 7, either or combination of the above-mentioned nonvolatile memory, a supply ink storage means, and a printing condition storage means is considered as a configuration which can be set up so that a store and elimination of storage information may be forbidden.

[0022] That is, if a store and elimination of storage information can be forbidden, when a case where a power supply was turned off suddenly and a power supply becomes instability, and a noise increase, required storage information is not updated and a printer can be driven in the original condition after re-powering on. For example, since storage information on a supply ink storage means is still origin, in spite of having already supplied ink after re-powering on at an ink supply system, it is going to perform supply of further different ink and ink is not mixed. Moreover, an arm head is not driven using ink currently supplied to an ink supply system, and different ink. Furthermore, when a power supply becomes instability, information for computing the above-mentioned amount of the ink used is memorized for a printing condition storage means etc., and if an ink residue is updated based on the memorized amount of the ink used concerned after a power supply is stable, a more exact ink residue can be obtained. Here, as a

flume which forbids a store and elimination of storage information, when storage information needs to be updated of course, it updates by canceling a prohibition condition of a store and elimination.

[0023] Furthermore, invention according to claim 9 is considered as a configuration in which the above—mentioned head actuation control means performs a comparison of a class of the above—mentioned ink at the time of exchange of the above—mentioned ink cartridge in a printer control unit given in either above—mentioned claim 1 – claim 8 as an example of a configuration for controlling to prevent mixing of ink in the above—mentioned head actuation control means. That is, a printer concerning this invention is considered [mistaking a class of ink in many cases at the time of this exchange since it is exchangeable, and] in an ink cartridge, and can prevent mixing of ink certainly by performing the above—mentioned comparison at the time of this exchange. It constitutes so that various modes can be adopted in order to detect exchange of an ink cartridge here, for example, it may remove with the time of wearing of an ink cartridge and a predetermined signal may sometimes be outputted, and when a signal which shows wearing is detected, it can constitute so that a comparison may be performed.

[0024] Furthermore, invention according to claim 10 has considered [as an example of the configuration for preventing mixing of ink in the above-mentioned head actuation control means] as the configuration which updates at a class of the supplied ink concerned in a class of ink memorized by the above-mentioned supply ink storage means in a printer control unit given in either above-mentioned claim 1 - claim 9, after the above-mentioned head actuation control means supplies ink to the above-mentioned ink supply system.

[0025] That is, since a printer concerning this invention can change suitably a class of ink used by exchange of a cartridge, in case it changes a class of the ink concerned, it will also wash ink currently supplied to the above-mentioned ink supply system, and will newly be resupplied. Then, if a class of ink memorized by supply ink storage means by head actuation control means after supply of ink to an ink supply system is updated, an arm head can be driven using always proper ink by the comparison of a class of the above-mentioned ink, even if it carries out the message exchange of ink what times, and mixing of ink can be prevented.

[0026] Thus, while memorizing a class of ink, and a residue of ink to nonvolatile memory carried in an ink cartridge and preventing mixing of ink with reference to these, the technique of grasping a residue of ink proper does not necessarily need to be restricted to equipment with substance, and functioning also as the method can be understood easily. For this reason, invention concerning claim 11 – claim 20 is considered as a configuration corresponding to a control method which said printer control unit enforces. That is, there is no difference not only in equipment which not necessarily has substance but in being effective as the method. [0027] By the way, such a printer control unit contains not only this but various kinds of modes as thought of that it may be used in the condition of existing independently and having been included in a certain device, and invention. Therefore, it can change suitably that it is software or hardware etc. When becoming the software of a printer control unit as an example of embodiment of thought of invention, naturally it exists on a record medium which recorded this software, and it must be said that it is used. Invention which starts claim 21 – claim 30 in the semantics is considered as a configuration corresponding to each step which makes said printer control unit carry out by computer.

[0028] of course, the record medium may be magnetic-recording data medium, may be magneto-optic-recording data medium, and can completely be considered the same way in any record media developed from now on. Moreover, about duplicate phases, such as a primary replica and a secondary replica, it is equivalent without room to completely ask. If above-mentioned data medium is the case where it carries out as the supply method using a communication line although it differs, a communication line serves as a transmission medium and this invention will be used.

[0029] Furthermore, a part is software, when a part is realized by hardware, there is nothing that is completely different in thought of invention, and it may be made into a thing of a gestalt which memorizes a part on a record medium and is read suitably if needed. Moreover, when carrying out this invention by software, it not only realizes as data medium by which invention recorded a

program, but naturally this invention is realized as the program itself, and the program itself is included in this invention.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline perspective diagram showing the internal configuration of an ink jet printer.

[Drawing 2] It is the block diagram of an ink jet printer.

Drawing 3 It is drawing showing the important section of the memory map of a flash memory.

[Drawing 4] It is drawing showing the pattern of the applied voltage generated in a head actuator.

[Drawing 5] It is the schematic diagram having shown the outline of the control which a printer control unit carries out.

Drawing 6 It is the flow chart of the processing which CPU performs.

[Drawing 7] It is the flow chart of the processing which CPU performs.

[Drawing 8] It is the flow chart of the processing which CPU performs.

[Drawing 9] It is drawing showing the example of a display of an error message.

[Drawing 10] It is drawing showing the example of a display of an error message.

[Drawing 11] It is drawing showing the example of a display of an error message.

[Drawing 12] It is the timing chart which shows actuation of each part.

[Description of Notations]

10 -- Ink jet printer

11 -- Maine substrate

12 -- CPU

13 -- ASIC

14 -- Flash memory

16 -- Head actuator

20 -- Printing section

21 -- Roller

22 -- Arm head

22a -- Tube

30 -- Panel section

31 -- Liquid crystal display object

32 -- Manual operation button

40 -- Cartridge section

41 -- Sub substrate

41a -- Control IC

42 -- Cartridge holder

43 -- Ink cartridge

43a -- Cartridge memory

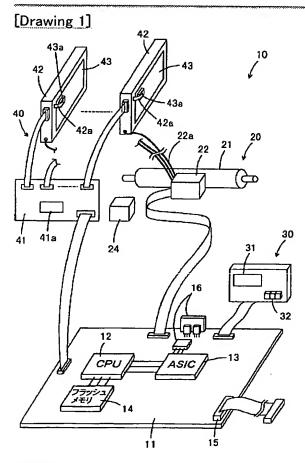
50 -- Personal computer

* NOTICES *

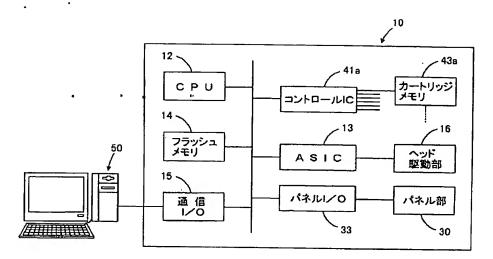
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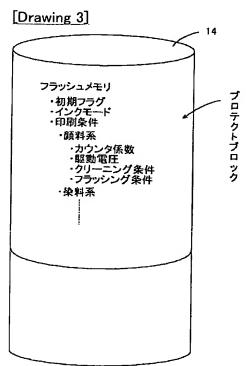
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DRAWINGS

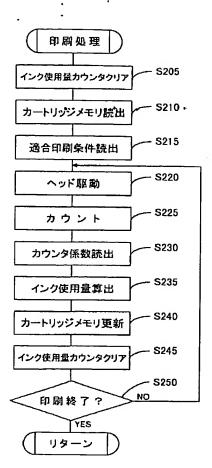


[Drawing 2]

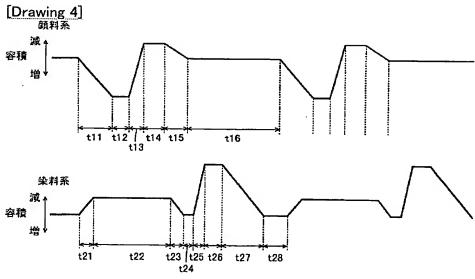




[Drawing 7]



W. . .



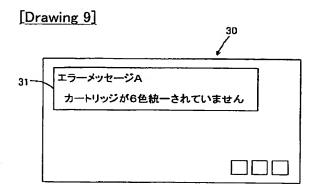
[Drawing 5]

43 インクカートリッジ・ 43a フラッシュメモリ インクモード 卸料系制御 染料系制御 染料系制御

ASIC

ヘッド駆動

カウンタ係数

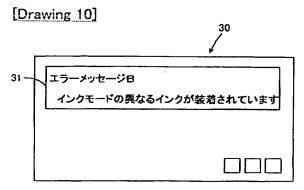


43a…カートリッジメモリ

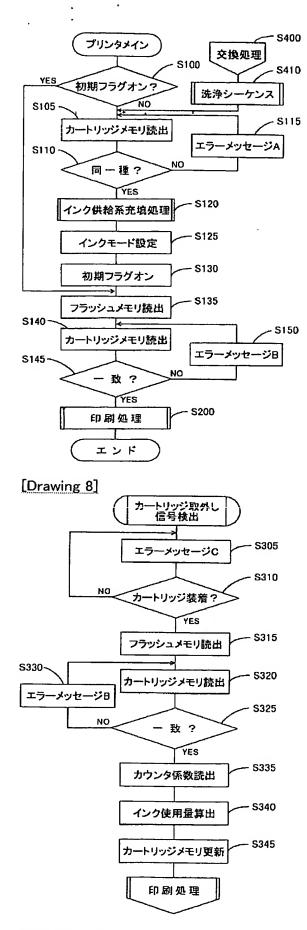
更新

カウント値

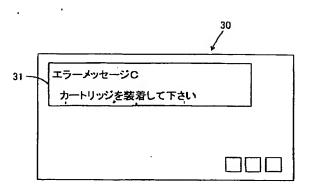
インク残量・

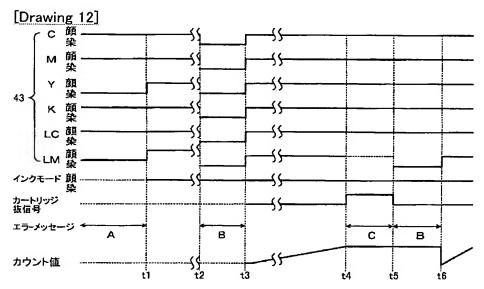


[Drawing 6]



[Drawing 11]





[Translation done.]

(19) 日本国物新 (1 P) (12) 公開特許公報 (A)

(11)特許出顧公開番号 特開2002-192810

(P2002-192810A)

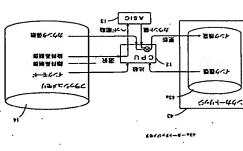
(43)公開日 平成14年7月10日(2002.7.10)

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(54) 【発明の名称】. ブリンタ街筒装置、プリンタϴ筒方法およびブリンタϴ筒ブログラムを記録した媒体

57) [契約]

「韓題」 インクカートリッジの交換によったインクの貧額を変更可能なプリンクにおいて、異系統のインクが 競合すると印刷品質が損なわれる。また、インクの残留を適正に判定することができなかった。 

[特許請求の範囲]

「酵水項1】 交換可能なインクガートリッジに売塩されたインクをヘッドに供給しながら印刷を行うプリンクを割御するプリンク制御業置であって、

配徳内容を更新可能であって上記インクカートリッジに搭載されるとともに当算インクカートリッジに充填されるインケの積製を記憶する不揮発性メモリと、

上記インクカートリッジを着脱可能であるとともに同インクカートリッジ接着時に上記不輝器性メモリからのデータ送受信を可能にするインクカートリッジ指脱能と、上記インクカートリッジから上記へッドへのインク供給系に供給されているインクの種類を記憶する供給インク

上記印刷におたり上記ヘッドの駆動に必要な印刷条件を上記インクカートリッジに充填されるインクの種類別に記憶する印刷条件記憶を受し、

記憶手段と、

上野不輝現性メモリに記憶されたイングの種類と上配供給インク記憶手を比較して、両者のインクの種類とも比較して、両者のインクの種類が一致する状態で上記印刷条件に借手段に配憶された印刷条件に甚么いてヘッドの駆動を開御しつつ適宜所定の情報を上記不輝発性メモリに替き込むヘッド駆動制御手段とを具備することを特徴とするブリンタ制御装置。

ຂ

【諸求項2】 上記請求項1に記載のプリンタ制御装置において、

たがい、 上的不確保性メモリは、インクカートリッジに表現されるインクの発金を記憶しており、上記ヘッド架動制等手段は、上記~ッドの整動に伴って消費するインクの使用金を算出するとともに当該算出に基づいて上記不確保性メモリに記憶されたインクの残量を更新することを特徴

「請求項3】 上記請求項2に記載のブリンタ制御装置において、 において、 上記へッド駆動制御手段は、上記へッドの駆動とともだ

とするプリンタ制御装置。

上記へッド駆動制御手段は、上記へッドの駆動とともに始かったカヴンタに基づいてイング使用曲を貸出することを発展することを整けることを整置します。

とを特徴とするブリンタ制御装置。 【静求項4】 上記請求項3に記載のブリンタ制御装置 上記印刷条件記憶手段は、上記カウンタのカウント値に乗ずることによってインク使用金を算出するためのインク使用金算出係数を記憶することを特徴とするブリンタ

[酵水質5] 上記酵水質1~酵水質4のいずれかに記覧のブリンタ制物装置において、 上記印刷条件記憶年段は、上記ヘッドを駆動する際に印めままままま。

上記印刷条件記憶手投ば、上記ヘッドを整動する際に印加する蘇助電圧パターンを記憶することを特徴とするプリンク影筒装置。 「おク影筒装置。 【韻水項6】 上記請求項1~請求項5のいずれかに記 親のプリンタ制御装置において、 上記印刷条件記憶手段は、上記ヘッドにおけるインク供 50 メモリに記憶されたインクの表金を更新することを特徴

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給系のクリーニングに必要な配動条件を配値することを 特徴とするブリンタ制御装置。

作はできるカインでは200m。 【時共項7】 上記請求項1~請求項6のいずれかに記載のプリンク制御装置において、 上記印刷条件記憶手段は、上記ヘッドにおけるフラッシングに必要な駆動条件を記憶することを特徴とするプリ

・/ mirracm... 【請求項8】 上記請求項1~請求項7のいずれかに記 戦のブリンタ戦御装置において、

10 上記不解発性メモリと供給インク記憶年段と印刷条件配 18年段とのいずれかまたは組み合わせは、記憶情報の母 込と消去とを禁止するよう設定可能であることを特徴とするブリンタ制御装置。 【請求項9】 上記請求項1~請求項8のいずれかに記載のグリンク制部設置において、 性のグリンク制部設置において、 上記へット駆動制部手段は、上記インクカートリッツの

Mのノッノア町の英国において、 上的ヘッド駆動制御手役は、上記インクカートリッジの交換時に上記インクの種類の比較を実行することを特徴とするプリンタ制御装置。 【請求項10】 上記請求項1~請求項9のいずれかに 記載のプリンタ制御装置において、

上的〜ッド駆動側部手段は、上記インク供給系にインクを供給した後に上記供給インク配信手段に記憶されるインクの種類を当成供給したインクの種類や当成供給したインクの種類や更新することを特徴とするプリンタ制御装配

「指求項」」 配信内容を文飾可能であって充填されるインクの値類を記憶する不審発性メモリを搭載するともに接着部に着脱することによって交換可能なイングカートリッジに充填されたインクをヘッドに供給しながら印刷を行うプリンクを制御するプリンク制御方法であら印刷を行うプリンクを制御するプリンク制御方法であ

「記んソッカートリッジから上記ヘッドへのインク供給深に供給されているインクの道路を記憶する供給イングの道路を記憶する供給イング記憶工程と

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上記印刷にあたり上記へッドの収動に必要な印刷条件を 上記インクカートリッジに完填されるインクの種類別に 記憶する印刷条件記憶工程と、 上記不揮発性メモリに配信されたインクの種類と上記供給インク配信工程に配信されたインクの種類とも比較して、両者のインクの種類が一致する状態で上記印刷条件の配信工程に配信された印刷条件に基づいてヘッドの駆動を開始しつつ適宜所定の情報を上記不解発性メモリに替き込むヘッド駆動制御工程とを具備することを特徴とす

るプリンク制御方法。 【請永項12】 上記請朱項11に記載のプリンタ制御 方法において、

特開2002-192810

「請求項13】 上記請求項12に記載のプリンタ制約 とするプリンタ制御方法。

上記ヘッド駆動制御工程では、上記ヘッドの駆動ととも に増加するカウンタに基づいてインク使用量を算出する ことを特徴とするプリンタ制御方法。

【詩水項14】 上記詩水項13に記載のプリンタ制御

方法において

上記印刷条件記憶工程では、上記カウンタのカウント値 に繋ずることによってインク使用虫を貸出するためのイ ンク使用量算出係数を配엽することを特徴とするプリン

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[請求項15] 上記請求項11~請求項14のいずれ かに記載のプリンタ慰御方法において、

上記印刷条件記憶工程では、上記ヘッドを駆動する際に 印加する駆動電圧パターンを配値することを特徴とする プリンタ配卸方法。 [開次項16] 上記請求項11~請求項15のいずれ、 かに記載のプリンタ慰詢方法において、

上記印刷条件記憶工程では、上記ヘッドにおけるインク **共給系のクリーニングに必要な駆動条件を配値すること** を特徴とするプリンタ制御方法。 【請求項17】 上記請求項11~請求項16のいずれ かに記載のプリンタ制御方法において、

上記印刷条件記憶工程では、上記ヘッドにおけるフラッ シングに必要な駆動条件を配憶することを特徴とするブ 【請求項18】 上記請求項11~請求項17のいずれ かに記載のプリンタ制御方法において、

リンタ転御方法

上記不煩発性メモリと供給インク配位工程と印刷条件配 **億工程とのいずれかまたは組み合わせは、配館情報の書** 込と消去とを禁止するよう設定可能であることを特徴と するプリンタ制御方法。 [請求項19] 上記請求項11~請求項18のいずれ かに記載のプリンタ制御方法において、

上記ヘッド駆動制御工亀では、上記インクカートリッジ の交換時に上記インクの種類の比較を実行することを特 数とするプリンタ転卸方法。

[請求項20] 上記請求項11~請求項19のいずれ

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クを供給した後に上記供給インク配億工程にて配憶され 上記ヘッド駆動制御工程では、上記インク供給系にイン たインクの種類を当該供給したインクの種類で更新する かに記載のプリンタ勉御方法においた、 ことを特徴とするプリンタ制御方法。

[請求項21] 記憶内容を更新可能であって充填され ら印刷を行うプリンタをコンピュータにて制御するため るインクの種類を記憶する不輝発性メモリを搭載すると カートリッジに充填されたインクをヘッドに供給しなが ともに装着部に着脱することによって交換可能なインク のプリンタ慰얼プログラムを記録した媒体かむらん、

上記プリンタ本体に搭載された不輝発性メモリに対して 上記インクカートリッジの不揮発性メモリに記憶された インクの種類を試み出したインクカートリッジ内のイン **予め記載されている当該プリンタが使用中のインクの猛** クの種類を判定する機能と 類を読み出す機能と、

者のインクの種類が一致する場合には上配プリンタ本体 に搭載された不揮発性メモリにてインクの種類別に記憶 **しつ適宜所定の情報を上記インクカートリッジの不揮発** 在メモリに借き込むヘッド駆動制御機能とをコンピュー タに実行させることを特徴とするプリンタ制御プログラ 明定された上記インクカートリッジのインクの種類と上 2説み出されたインクの種類とを比較するとともに、 両 された印刷条件を託み出して上記ヘッドの駆動を制御し ムを配録した媒体。

【請求項22】 上記請求項21に記載のプリンタ制御 プログラムを配録した媒体において、 上記不輝発性メモリは、インクカートリッジに充填され るインクの残量を配億しており、上配ヘッド駆動制御機 用量を算出するとともに当該算出に基づいて上配不揮発 続では、上記ヘッドの慰動に守って消費するインクの使 性メモリに記憶されたインクの残量を更新させることを 特徴とするプリンタ制御プログラムを記録した媒体。 ន

[静水項23] 上記請水項22に記載のプリンタ制御 プログラムを配録した媒体において、 上記ヘッド駆動制御機能では、上記ヘッドの駆動ととも に増加するカウンタに基心にインク使用歯を算出する ことを特徴とするプリンタ制御プログラムを配録した媒

上記印刷条件をインクの種類別に記憶する不知発性メモ リでは、上記カウンタのカウント値に乗ずることによっ **ドインク使用量を算出するためのインク使用量算出係数** を配伍することを特徴とするプリンタ制御プログラムを プログラムを配録した媒体において、

[請求項24] 上記請求項23に記載のプリンタ制御

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【請求項25】 上配請求項21~請求項24のいずれ いに記載のプリンタ制御プログラムを記録した媒体にお 配録した媒体。

リでは、上記ヘッドを駆動する際に印加する駆動電圧パ 上記印刷条件をインクの種類別に記憶する不輝発性メモ ターンを配位することを特徴とするプリンタ制御プログ ラムを記録した媒体。

|請求項26| 上記請求項21~請求項25のいずれ かに配載のプリンタ制御プログラムを配録した媒体にお 上記印刷条件をインクの種類別に記憶する不揮発性メモ リでは、上記ヘッドにおけるインク供給系のクリーニン グに必要な駆動条件を配置することを特徴とするプリン 々制御プログラムを記録した媒体。 S

|静水項27] 上記請水項21~請水項26のいずれ かに配載のプリンタ制御プログラムを配録した媒体にお

L記印刷条件をインクの種類別に記憶する不揮発性メモ リでは、上記ヘッドにおけるフラッシングに必要な駆動 条件を配置することを特徴とするプリンタ制御プログラ ムを配殴した媒体。 上記請求項21~請求項27のいずれ かに記載のプリンタ制御プログラムを記録した媒体にお [辦水項28]

上記インクカートリッジとプリンタ本体に搭載された不 揮発性メモリのいずれかまたは組み合わせは、記憶情報 の魯込と消去とを禁止するよう設定可能であることを特 徴とするプリンタ制御プログラムを記録した媒体。

[請求項29] 上記請求項21~請求項28のいずれ かに記載のプリンタ制御プログラムを記録した媒体にお

上記ヘッド駆動制御機能では、上記インクカートリッジ の交換時に上記インクの種類の比較を実行することを特 徴とするプリンタ制御プログラムを配録した媒体。

「静水項30】 上記請水項21~請水項29のいずれ かに記載のプリンタ制御プログラムを記録した媒体にお **上記ヘシド野勢動御御御行は、上記インク供給米にイン**

クを供給した後に上記プリンタ本体に搭載された不揮発 ンクの種類で更新することを特徴とするプリンタ制御プ 性メモリにて配像されたインクの種類を当該供給したイ ログラムを記録した媒体。

[9000]

[発明の詳細な説明]

置、プリンタ制御方法およびプリンタ制御プログラムを [発明の属する技術分野] 本発明は、プリンタ制御装 D段した媒体に関する。

[0002]

[従来の技術] 写真と同等の画質によって印刷を実行で きるプリンタとして、インクジェットプリンタが近年急 版に普及しつしむる。 いのインクジェットプリンタにお いたは、一般に顔料系インクと弥料系インクとの2種類 が使用されている。この2種類のインクはそれぞれの特 性によって画質および耐光性などに一乗ー短があり、ど ちらも広く用いられている。また、上記2種類のインク は粘度、密度等が異なっており、同一のヘッドを用いる 場合であっても、前記特性に対応させつし適切な印刷を 異行するため、顔料茶インクと染料茶インクとではイン クの吐出量や吐出タイミング等の制御条件がそれぞれ異

[0003]

ちち、2種類のインクを使用可能なプリンタにおいても ジェットプリンタにおいては以下の禁題があった。すな [発明が解決しようとする群題] 上述した従来のインク

ク供給系内部で異系統のインクが統合してしまう。 2 種 印刷品質が損なわれる。従って、上記2種類のインクを ンク種類の交換時においてインク供給系の交換や洗浄が インク供給系の交換や洗浄をしないうちに間違って異な る種類のインクカートリッジを装着してしまうと、イン は、インク供給系におけるインクの混合を防ぐため、イ 数のインクが配合してしまった場合においては、イング の特性に応じた吐出虫制御海を実行できなくなるため、 交換して使用可能なインクジェットプリンタにおいて 必要となっている。 2

度インクの種類を元に戻した場合、元のカートリッジの インク残量を正しく判定することができないという問題 はインクカートリッジに充填されているインクの換曲を カートリッジを交換可能であることから、インクを途中 まで使った後にインクの種類を切り替え、さらにもう一 [0004] さらに、インクジェットプリンタにおいて が、七ばした紋米のインクジェットプリンタではインク を使い切る前に顔料系インクと弥料来インクとでインク 監視し、ステータスとして液示したりする場合がある 20 があった。

[0005] 本発明は、上記課題にかんがみてなされた もので、インク種類の交換が可能なプリンタにおいて異 **采従のインクの混合を防止しながらインク種類に応じた** 適正な制御を実施するとともに、何度インクカートリッ ジを変更してもインク 残由を正しく判定することが 可能 なプリンタ転御装置、プリンタ制御方法およびプリンタ 則御装置を提供することを目的とする。

揮発性メモリが搭載され、同不輝発性メモリにはインク め、請求項1にかかる発明は、交換可能なインクカート リッジに充填されたインクをヘッドに供給しながら印刷 を行うプリンタを制御するように構成されており、イン ク種類の混合を妨止しながら制御する。このため、交換 可能なインクカートリッジには配債内容を更新可能な不 このインクガートリッジはイングガートリッジ被給的を 着時には上記不揮発性メモリからのデータ送受信が可能 介したプリンタ本体に遊脱されるようになっており、被 カートリッジに充填されるインクの種類が配憶される。 「戦闘を解決するための手段」上記目的を達成するた ន

駆動し、また、この一致するインク種類に適合する印刷 記憶され、印刷条件記憶手段にはヘッドの駆動に必要な [0007] さらに、インクカートリッジからヘッドま **トラインク 技結 チューブ 争ざ つ 権長 かれら インク 供給 座** に供給されているインクの建類は供給インク記憶手段に **中別条件がインクの種類別に配倒されている。 ヘッド駅** そして、両者のインクの種類が一致する状態でヘッドを **下御発性メモリに記憶されたインクの種類と上記供給イ** ンク配箇手段に配엽されたインクの種類とを比較する。 動制御手段は印刷にあたりこれのの配信情報を使用し、 ಜ

【0008】すなわち、上記不揮発性メモリに記憶され たインクの種類はインクカートリッジに充填されたイン クの種類と一葉的に一致し、供給インク配億手段に配億 ンクの種類と一般的に一致するので、ヘッド駆動制御手 段がこれらを比較することにより、インク供給系にすで に供給されているインクの種類と異なるインクの種類の インクカートリッジを使用してヘッドを駆動することを されたインクの種類はインク供給系に供給されているイ 防止し、インクの混合を防ぐことができる。

更新可能であって不超発性であれば良く種々の脑袋が採 おけばよいが、インクの毺類としてはこの他にも種々の 情報を配館することが可能である。すなわち、インクの 充填日を配値すれば、当該充填日を参照することにより [0009] ここで、上配不揮発性メモリは配値内容を 用可能であり、フラッシュメモリなどのEEPROMに て構成すると好適である。また、インクの種類は上述の 染料系のものであるか餌料系のものであるかを記憶して ようにしてインクの混合を防止するために使用され、こ のためにはインクの種類を示す情報として充塩インクが 使用期限の過ぎたインクを使用しないように構成するこ とができる。また、同系統のインクであっても成分が異 に対する母笹の駆動シーケンスでヘッドの駆動を制御す なる旨を示す情報を配憶することによって、そのインク ることができる。

をはめ込み式のホルダに装着し、当該はめ込みと同時に 不揮発性メモリの蝎子の導通を確保するような構成が可 リッジを着脱可能であって、インクカートリッジ装着時 ができれば良く、インクを充填可能な容稽を有する容器 フラッシュメモリなどのEEPROMにて構成すれ [0010] インクガートリッツ柏駅街はインクガート に不輝発性メモリからのデータ送受信を可能にすること 能である。供給インク配箇手段においてはインク供給系 に供給されているインクの種類を記憶することができれ ば良く、暫き換え可能な種々のメモリにて構成すること ができる。RAM母によっても構成可能であるが、プリ ンタは頻繁に低級がオン/オフされるものであるとこ

に必要な印刷条件を上記インクカートリッジに充填され 【0011】印刷条件記憶手段においてはヘッドの駆動 よって構成することもできるが、プリンタは使用によっ て逐次ステータスが変化し、特に本発明は使用インクが るインクの種類別に配修することができれば良く、種々 のメモリにて構成することができる。マスクROM等に シュメモリなどのEEP R-OMにて構成すれば好適であ **変更可能な態様であることから、巻き換え可能なフラッ** る。ヘッド制御駆動手段は、種々のメモリ等から情報を 既み出し、資算し、メモリやヘッド等を制御できれば良 く、CPU等で構成すれば好適である。

S -【0012】さらに、インク残盘を正しく判定できるよ

上記不揮発性メモリは、インクカートリッジに充填され るインクの残量を記憶しており、上記ヘッド駆動制御手 段は、上配ヘッドの駆動に伴って消費するインクの使用 **針を算出するとともに当該算出に基づいて上配不御発性** メモリに記憶されたインクの残量を更新する構成として うに制御するための構成として請求項2に記載の発明 は、上配請求項1に記載のプリンタ制御装置において、

を取り外して他のブリンタに装着させつつ使用しても当 ンクの残虫はインクカートリッジ自体に搭載される不確 発性メモリに配엽されるので、充填されたインクを消費 **残量は適正なものとなる。むろん、インクカートリッジ** 核他のプリンタが本発明にかかるプリンタ制御装置を具 [0013] すなわち、プリンタの駆動とともにインク 再び取り外したインクカートリッジを使用してもインク する前に取り外して他のインクカートリッジを使用し、 の残由が更新されるので適正なインクの残由となる。 備していれば、適正なインク残量となる。

の使用量を算出する手法は様々であり、そのための構成 配載のプリンタ制御装置において、上記ヘッド駆動制御 わち、印刷時にはヘッドが駆動されるので当該ヘッドの の一例として請求項3に記載の発明は、上記請求項2に **手段は、上記ヘッドの駆動とともに増加するカウンタに** 基づいてインク使用量を算出する構成としてある。すな 駆動とともにカウント値が増加するカウンタを使用すれ ば、当該カウント値に基づいて容易に使用量を算出する 【0014】また、ヘッド駆動制御手段によってインク ことができる。より具体的には、ヘッドによって吐出す

る。本発明においてはインクの種類を変更可能やあるの で、同じドット数でもインクの種類によって使用量が異 なる場合があるが、ドット数に基づいたインクの種類年 に使用金を算出すればよい。このようにカウント値に基 **ろいてインクの使用虫を算出する場合には、このカウン** トはインクの種類によって特に区別することなく単一の るドット教をカウントするような手法が採用可能であ カウンタを設けるだけでよい。

する必要がある印刷条件の具体例として請求項4に記載 の発明は、上記請求項3に記載のプリンタ制御装置にお [0015] さらに、上記ヘッドの駆動に必要な印刷条 ト値に発することによってインク使用虫を算出するため 件としては種々の条件が存在し、インクの種類別に配飽 いて、上記印刷条件記憶手段は、上記カウンタのカウン のインク使用毎算出係数を記憶する構成としておる。

ことによってインク使用量を算出するようなインク使用 **国算出係数を設ければ、一回の乗算のみで容易にカウン** [0016] すなわち、上述のカウント値とインクの使 用量とは通常比例関係にあるので、カウント値に乗ずる ト値から使用盘を得ることができる。また、インクの種 ンク使用量係数を配憶するのみで良く、非常に簡単に構 類毎に使用盘を算出するためには、インクの種類毎のイ

成することができ、インクの種類が増えたり特性の異な るインクに対応する必要が生じたときにも簡単に対応す

もる印刷条件の他の具体例として請求項5に記載の発明 ッドを駆動する際に印加する駆動電圧パターンを配憶す のインクのようにインクの種類が異なると、ヘッドを駆 [0017] さらに、インクの種類別に配値する必要が は、上記請求項1~請求項4のいずれかに記載のプリン 助する条件が異なる。例えば、ピエン菓子の伸縮等によ ったイングの吐出曲や吐出タイミング等を制御するプリ **叶出曲や叶出タイミング等が異なってくる。これらの吐** タ制御装置において、上配印刷条件記憶手段は、上記へ る構成としてある。すなわち、歯粒糸のインクと染粒米 ンタの場合、上記インク種類が異なれば、一回のイング 出母等はヘッドに印加される駅動館圧パターンを変更す ることによって慙御されることから、臼邑≪弁としてイ ンクの種類別に駆動電圧パターンを記憶すると容易にイ ノクの種類に応じた印刷を実行することができる。

ある印刷条件の他の具体例として請求項6に記載の発明 [0018] さらに、インクの種類別に配値する必要が は、上記請求項1~請求項5のいずれかに記載のプリン ッドにおけるインク供給系のクリーニングに必要な駆動 ンタを使用しなかった場合や印刷品質が低下してきた場 合にインク供給来をクリーニングすることがあり、この とから、排出を的確に行わせるためにはインクの種類毎 タ制御装置において、上配印刷条件配箇手段は、上配へ 条件を配箔する構成としてある。すなわち、長時間プリ の条件でヘッドを駆動する必要があり、このような場合 祭にはインクを一旦排出してワイビング等を実施するこ 7. 単行するいとだっかる。

[0019] さらに、本発明においてはインクの種類を クの種類毎の条件でヘッドを駆動する必要があり、この 女投できるようになっていることから、交換に際しては カートリッジからヘッドまでのインク供給承をも死诤す る必要があり、かかる洗浄シーケンスを実行する場合に 的確にインク供給系のインクを排出させるためにはイン ような場合にも対応することができる。

は、上記請求項1~請求項6のいずれかに記載のブリン [0020] さらに、インクの種類別に記憶する必要が ある印刷条件の他の具体例として請求項7に記載の発明 ッドを駆動する必要があり、このような場合に対応する 夕制御装置において、上記印刷条件記憶手段は、上記へ ッドにおけるフラッシングに必要な駆動条件を記憶する 解成としてむる。すなわち、ワイピングによりノメルか の逆流した説色インクを引出排出したり、インクの趨粘 ることがあるが、このフラッシングを実行するタイミン よって決定されるべきものであることから、的確にファ による目詰まりを防止するためにフラッシングを実行す がやフラッシング時の吐出排出虫はインク種類の特性に ッシングを実行するためにはインクの種類毎の条件でへ

特阻2002-192810

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請求項8に記載の発明は、上記請求項1~請求項1のい ずれかに記載のプリンタ制御装置において、上記不揮発 【0021】さらに、プリンタの電源が不意にオフにな し、インク残量を適切に判定し、的確にインクの種類毎 のヘッド駆動を実行可能に構成するための具体例として 性メモリと供給インク配億手段と印刷条件配億手段との **った場合などにも、再館原投入後にインクの混合を防止** いずれかまたは組み合わせは、配售情報の書込と消去と を禁止するよう設定可能である構成としてある。

[0022] すなわち、配億情報の曹込と消去とを禁止 することができれば、電頂が不食にオフになったりして る。例えば、再電源投入後に供給インク配館手段の配館 情報は元のままであるので、インク供給系にすでにイン い。また、インク供給来に供給されているインクと異な に、電源が不安定になったときに上記インク使用量を算 話づいたインク校盘を更新すれば、より正確なインク校 量を得ることができる。ここで、記憶情報の曹込と消去 **虹灰が不安定になった場合やノイズが増加した場合なと** クが供給されているにもかかわらず、さらに異なるイン クの供給を実行しようとしてインクを混合することはな るインクを使用してヘッドを駆動することもない。 さら き、電源が安定化した後に当な記憶したインク使用量に とを禁止するといっても、むろん記憶情報の更新が必要 開源投入後に元の状態でプリンタを駆動することができ 出するための情報を印刷条件配筒手段等に記憶してお なときには哲込と消去の禁止状態を解除して更新を行 においても必要な記憶情報が更新されることはなく、 ន

時に上記比較を実行することにより、陥実にインクの混 [0023] さらに、上記ヘッド駆動制御手段において インクの混合を防止するように制御するための構成の具 上記ヘッド駆動制御手段は、上記インクカートリッジの トリッジを交換可能であるため、この交換時にインクの 体例として請求項9に記載の発明は、上記請求項1~請 猛類を殴ってしまうことが多いと考えられ、かかる交換 合を防止することができる。ここで、インクカートリッ り、たとえば、インクカートリッジの装着時と取り外し 時に所定の信号を出力するように構成し、装箔を示す信 **水項8のいずれかに記載のプリンタ制御装置において、** 交換時に上記インクの種類の比較を実行する構成として ある。すなわち、本発明にかかるプリンタはインクカー ジの交換を検出するためには種々の態模が採用可能であ **号を検出したときに比較を実行するように構成すること** ŧ

インクの混合を防止するための構成の具体例として請求 [0024] さらに、上記ヘッド駆動制御手段において 項10に記載の発明は、上記請求項1~請求項9のいず れかに記載のプリンタ制御装置において、上記ヘッド駅 動制御手段は、上記インク供給系にインクを供給した後 ය

すると、何度インクの交換処理をしても上記インクの種 類の比較によって常に適正なインクを使用しつつヘッド を駆動することができ、インクの混合を防止することが に上記供給インク記憶手段に記憶されるインクの種類を トリッジの交換によって使用するインクの種類を適宜変 **更可能であることから、当該インクの種類の変更を行う** 際には上記インク供給系に供給されているインクも充準 し、斑れに供給し直すことになる。そこで、インク供給 なに対するインクの供給後にヘッド駅動制御手段によっ て供給インク配億手段に配憶されるインクの徴類を更新 [0025] すなわち、本発明にかかるプリンタはカ-当該供給したインクの種類で更新する構成としてわる。

項11~請求項20にかかる発明は、前記プリンタ制御 れた不知路性メモリにインクの種類とインクの残量とを るとともにインクの残量を適正に把握する手法は必ずし 装置が実施する制御方法に対応した構成としてある。す 【0026】このように、インクカートリッジに搭載さ 記憶しておき、これらを参照してインクの混合を防止す も実体のある装置に限られる必要はなく、その方法とし ても機能することは容易に理解できる。このため、請求 なわち、必ずしも実体のある装置に限らず、その方法と しても有効であることに相違はない。

てプリンタ制御装置のソフトウェアとなる場合には、か かるソフトウェアを記録した記録媒体上においても当然 適宜、変更可能である。発明の思想の具現化例とし 【0027】ところで、このようなプリンタ制御装置は 単独で存在する場合もあるし、ある機器に組み込まれた 状態で利用されることもわるなど、発明の思想としては ソフトウェアでおったりハードウェアであったりするな で、請求項21~請求項30にかかる発明は、前記プリ ンク制御装置をコンピュータで実施させる各ステップに これに限らず、各種の植様を含むものである。従って、 に存在し、利用されるといわざるをえない。 その意味 **払朽した権权としたもる。**

複製段階については全く間う余地無く同等である。上記 ることができる。また、一次複製品、二次複製品などの 行なう場合であれば通信回線が伝送媒体となって本発明 [0028] むろん、その配段媒体は、設気記録媒体で あってもよいし光铅気配砂媒体であってもよいし、今後 媒体とは異なるが、供給方法として通信回線を利用して 開発されるいかなる配録媒体においても全く同様に考え が利用されることになる。

媒体として実現されるのみならず、本発明がプログラム 部がハードウェアで実現されている場合においても発明 の思想において全く異なるものはなく、一部を記録媒体 上に記憶しておいて必要に応じて適宜銃み込まれるよう トウェアで奥施する場合、発明がプログラムを記録した 【0029】さらに、一部がソフトウェアであって、一 な形態のものとしてあってもよい。また、本発明をソフ

自体として実現されるのは当然であり、プログラム自体 も本発明に含まれる。

1、請求項21にかかる発明によれば、インクの混合を 坊止することができ、インクの種類に応じた適切な制御 を実行することが可能なプリンタ船御装置、プリンタ制 **卸方法およびプリンタ制御プログラムを記録した媒体を** [発明の効果]以上説明したように請求項1、請求項1 **処供することができる。** [0031] また、請求項2、請求項12、請求項22 にかかる発明によれば、インクカートリッジ内の適正な 3、請求項13、請求項23にかかる発明によれば、容 **あにインク使用虫を算出することができる。さらに、請** ば、インクの種類毎に使用金を算出するための構成を容 易に実現することができ、カウント値から容易に使用量 请求項25にかかる発明によれば、容易にインクの種類 を得ることができる。さらに、請求項5、請求項15、 水項4、請水項14、請水項24にかかる発明によれ インク残量を判定することができる。さらに、請求項 に応じた印刷を実行することができる。

[0032] さらに、請求項6、請求項16、請求項2 6にかかる発明によれば、インクの種類毎の条件でクリ **ーニングを行うことができる。さらに、請求煩り、請求** 項17、請求項27にかかる発明によれば、インクの種 よれば、プリンタの電源が不費にオフになった場合など にも、再電原投入後にインクの混合を防止し、インク費 **最を適切に判定し、的臨にインクの種類毎のヘッド駆動** 9、請求項29にかかる発明によれば、確実にインクの 鬼合を防止することができる。さらに、請求項10、請 水頂20、請水項30にかかる発明によれば、確実にイ に、請求項8、請求項18、請求項28にかかる発明に を実行することができる。さらに、請求項9、請求項1 類毎の条件でフラッシングを行うことができる。さら ンクの混合を防止することができる。 ജ

[0033]

[発明の実施の形態] 以下、図面にもとかいて本発明の **かるプリンタ制御装置を搭載したインクジェットプリン** タの内部構成を示す概略斡視図であり、図2は当数イン に印刷的20とパネル的30とカートリッジ的40とが 史施形態を説明する。 図1は、本発明の一実施形態にか クジェットプリンタの各ハードウェアの後続状況を示す **ブロック図である。図において、インクジェットプリン** タ10はメイン基板11を備えており、メイン基板11 **飯碗されており、メイン基板11上に備えられたCPU** 12が各部を制御することによりプリンタとして機能す

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他、ASIC13とフラッシュメモリ14とヘッド慰動 的16とを備えている。ASIC13は後述するヘッド 22を駆動するためにカスタマイズされた10であり、 [0034]メイン基板11上には上記CPU12の S

L記CPU12と所定の信号を送受信しつつヘッド22 12個のための処理を行う。 この処理の一つとした、イン ク使用量カウンタを備えており、印刷されるドット数を 各インク色毎にカウントする。この他にも、後述するへ ッド駆動部16への印加電圧データを出力する。 ヘッド **駆動部16は専用ICと駆動用トランジスタと放敷板等** からなる回路であり後述するヘッド22に内積されるピ エゾ栞子への印加電圧パターンを生成する。

容を消去可能なEEPROMであり、チップー括または [0035] フラッシュメモリ14は、電気的に配位内 に、本実施形態にかかるフラッシュメモリ14はブート ブロック型であり、形角のプロックに対してはハードウ プロック単位でデータを消去することができる。さら ェア的なデータの巷込と消去とを禁止することができ

いモータによって回転しながら印刷用紙を送るように棒 [0036] 印刷館20は主にローラ21とヘッド22 とを備えており、ヘッド2 2 は上記メイン基板11と所 定の中継ケーブルを介して接続されている。ローラ21 は図示しないモータ制御部によって駆動される図示しな **成されている。ヘッド22は図示しないキャリッジに格** 戦されており、同キャリッジはヘッド22を上記ローラ 21の外周近傍に配設させるとともにヘッド22をロー ラ21の軸方向に往復移動可能にしている。

祭子が備えられており、上記チューブ22aから吐出口 よって、ドット単位でインクを吐出する。ヘッド22と [0037] ヘッド22には各インク色別のチューブ2 2gが接続されており、各色インクの供給を受けるよう になっている。また、ヘッド22には図示しないピエソ **まで連過するインク強でアエンボ子が慰覚されることに** ヘッド駆動制 1 6 とは所定の中継ケーブルおよび基板上 の配様によって接続されており、関ヘッド駆動部16は 上記ASIC13からの指令に応じて所定の電圧を生成 するとともにヘッド22に同生成電圧を印加し、上記キ **ナリッジやアエン班子や感覚するていになっている。**

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ン32とを備えており、パネル部30は上記メイン基板 ら送信される所定の信号に基づいて文字等を表示するデ イスプレイであり、エラーメッセージやステータス等が [0038] パネル曲30は液晶数示体31と操作ボタ 11とパネル1/033を介して所定の中様ケーブルに よって接続されている。液晶表示体31はCPU12か 敷示可能である。 麹作ボタン32は、ユーザやサービス **マンポインクジェットプリンタ 10 を操作する際に使用** するボタンであり、単独のボタン押し込み操作や複数の ボタン押し込み機作によって上記CPU 1 2 が数作内容 **ラーメッセージの解除、インク交換処理の実行、クリー** を判別し、電源のON/OFFや印刷データの排出、

යි トリッジホルダ42とインクカートリッジ43とを備え [0039] カートリッジ部は主にサブ基板41とカー ニングの実行等を指示できるようになっている。

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トマゼンタ、ブラックの六色を使用するようになってお で、インクの種類としては監料系インクであるか顔料系 0はシアン, マゼンタ, イエロー, ライトシアン, ライ り、インクカートリッジ43にそれぞれのインクを充塩 を搭載しており、同カートリッジメモリ43gには充填 **たいる。本実拡形態にかかるインクジェットプリンタ1** する。インクカートリッジはカートリッジメモリ438 されるインクの種類とインクの残虫が配位される。ここ インクであるかを示すデータが記録される。すなわち

ートリッジメモリ43aと接触してデータ送受信のため 同カートリッジメモリ43aが上記不御発性メモリを憐 成する。各カートリッジホルダ42はカートリッジメモ の接続を確保する。また、上記カートリッジホルダ42 ューブ22ヵを介してインクカートリッジ43内に光塩 リッジ43がカートリッジホルダ42に装着されるとカ が備えている図ぶしない人ソク供給ロと被触したインク の供給組路を形成する。カートリッジホルダ42にはゲ ューブ22ヵが取り付けられるようになっており、周チ リッジ43が装着されると、同インクカートリッジ43 リ43aとの接触部42aを備えており、インクカート は図示しないインク供給針を備えており、インクカート されたインクが上記ヘッド22に供給される。 2

[0040] 各インクカートリッジ43はカートリッジ 43aとの通信回線が确保される。このように、本実施 ンタ10に搭載され、カートリッジホルダ42に装着さ れた状態や上記チューブ22gを介してインク供給可能 2には所定の中継ケーブル40が接続されており、イン **杉槌においては、カートリッジホルダ42が上配装着部** になるとともに上記カートリッジメモリ43aはデータ クカートリッジ43 がカートリッジホルダ42に装着さ れた状態で当数中継ケーブル40とカートリッジメモリ ホルダ42に装着されることによりインクジェットプリ を送受信可能になる。すなわち、カートリッジホルダ4

89、同サブ基板41上に落載されたコントロールIC 418から所定の信号が送受信されることによって上記 11に被続されている。上記コントロール [C 4 1 a は の類脱が行われたか否かを判別するために、カートリッ 【0041】カートリッジホルダ42に按続された中語 は、さらに所定の中様ケーブルを介して上記メイン基板 複数インクを使用すること、すなわち複数のカートリッ トリッジメモリ438に配録されたインクの複数の競み また、本契섪形態においては、インクカートリッジ43 ジホルダ42からインクカートリッジ43が取り外され ケーブル40はサブ基板41に接続されるようになって ジメモリ43aを魁御するために格数された1 Cであり メイン基板上のCPU12が所定の信号を送受信してコ ントロールIC41aと通信を行うことによって、カー カートリッジメモリ43aが制御される。サブ基板41 出しや、インク残虫の更新毎を行っようになっている。

トリッジ43の取り外しを示す信号を出力し、インクカ **ートリッジ43が装着されたときには、上記コントロー** ルI C 4 1 a がインクカートリッジ 4 3 の装着を示す信 たときには、上記コントロール I C 4 1 a がインクカー **号を出力するようになっている。**

ンクジェットプリンタ10用のドライバがインストール [0042] 上記メイン基板11上には、さらに所定の 通信1/015が備えられており、同通信1/015を されており、利用者がデジタル写真画像データの印刷を 実行するとドライバが所定のデータ変換等を行うととも 介したインクジェットプリンタ 100外部のコンピュー 0に送館し、上記CPU12が印刷指示に従って印刷デ タ50と接続される。コンピュータ50においては同イ に印刷ゲータと印刷指示とをインクジェットプリンタ 1 ークを印刷する。

14においては西系術のインクに対して適切な勧御を行 ップの要部を示している。本実施形態にかかるインクジ ェットプリンタ10は、繁粒米のインクと超粒米のイン うためにインクの米統別のパラメータ等が記憶されてい 5。具体的には、インク供給系すなわち上記チューブ2 2 a 内に所定のインクを充填する初期充填が行われたか 【0043】図3は、 クラッシュメモリ14のメモリマ クの双方が使用可能であることから、フラッシュメモリ 否かを示す初期フラグと、現在使用中のインクの種類を 示すインクモードとが配憶される。

クトプロックに配憶されている。このように、本実施形 態においてはフラッシュメモリ14が上記供給インク配 箇手段と印刷条件記憶手段とを構成する。 印刷条件には ング条件とがあり、カウンタ係数は上記ASIC13に おけるカウント値に乗ぜられる係数であり、当数聚算に 染料系双方のインク使用量を適切に算出する。また、超 **5 なぶのインクとな対象のインクとではインクの移在すな** グ、フラッシング等、同様の動作をさせるとしてもヘッ である印刷条件が超料系のインクと染料系のインクのや ドウェア的なデータの魯込と消去とを禁止可能なプロテ カウンタ係数と駆動電圧とクリーニング条件とフラッシ 【0044】さちに、インクの種類別の駆動パラメータ れぞれに対して配値されている。これらのデータはハー よってドット数という統一されたカウントから顔朴系。 わち粘度等が異なるので、インクの出出やクリーニン

1.2はかかるデータを睨み出して上記ASIC13に指 して適切な制御を行う。例えば、駆動電圧は印刷時に上 【0045】そこで、合味液毎に駆動臨圧とクリーニン グ条件とフラッシング条件とが配憶されており、CPU 示し、ヘッド駆動部 1 6 が当数指示に従った所定のヘッ ド駆動を実施することによって双方の系統のインクに対 記ヘッド駆動部16にて生成する印加電圧のパターンを 示すデータであり、図4に示すように異なるパターンで ド22の具体的な駆動は異なっている。 電圧を印加する.

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13に指示すると、ASIC13は当散タイマデータを る。ヘッド駆動部16は前配印加電圧データによって電 上昇パルスと下路パルスとがあり、上昇パルス中には印 福を閲覧することによって上記ヘッド駆動部16が生成 CPU12が同ルックアップデータを参照してASIC 王の時間的変化であるパルスを発生する。パルスは主に インク組の容徴が減少する。また、下降パルス中には印 インク組の容徴が増加する。 徐りて、これらのパルスの する亀圧は図4に示すような略台形状になり、かかる観 【0046】すなわち、印刷条件としての駆動館用はタ イマデータを記載したルックアップテーブルからなり、 加電圧が上昇するとともに上記ピエソ索子が駆動され、 加電圧が下降するとともに上記ピエソ業子が駆動され、 変換してヘッド駆動部 16に印加電圧データを出力す 日でインクの吐出が慰御される。

[0047] 同図4の上側の電圧パターンは顔料系のも のであり、当該顔料系のインクではまず期間 t 1 1 にお る。そして、期間 t 1 2 でパルスの入力を停止してピエ いて下降パルスを入力してインク室の容積を増加させ

14でパルスの入力を停止してこの状態を保持し、期間 を一定期間保持するとともにキャリッジを駆動して次の ソ粜子を保持することによりインクの状態を落ちつかせ た後、期間 t 1 3では上昇パルスを入力してインク室の 容積を減少させ、インクを吐出させる。 さらに、期間も この後、期間 t 1 6 でパルスの入力を停止してこの状態 t 15で下降パルスを入力して吐出インクを分断する。 ドットに対するインク中田ツーケンスを行う。

は染料系のものであり、当数染料系のインクではまず期 **落ちつかせた後、期間 t 2 3 では下降パルスを入力して** インク室の容積を増加させ、期間 t 2 4 でこの状態を保 **砕したインクの状態を落ちつかれる。さちに、越間 t 2** させ、インクを吐出させる。この後には、期間も26で [0048] これに対して、図4の下側の亀圧パターン 間も21において上昇パルスを入力してインク室の容徴 を成少させる。そして、期間も22でパルスの入力を停 比してピエゾ素子を保持することによりインクの状態を 5 では再び上昇パルスを入力してインク室の容積を成少 この状態を保持し、期間も27で下降パルスを入力して **吐出インクを分断し、期間 t 2 8 でこの状態を保持して** ードットの吐出シーケンスを終了する。

異なっており、それぞれの系統に適した制御を行うため ノクとではインク特性の差異からヘッド駆動パターンも にインク系統別に駆動電圧が保持されており、インクの 資類に応じた適宜参照される。この印題時の感動館用の **のための電圧も生成可能になっており、ヘッド22は当 数亀圧によって印刷とは関係のないインクの吐出を行な** 【0049】このように、個粒米のインクと歌粒米の人 也に、ヘッド駆動部16はクリーニングやフラッシンク うことができる。すなわち、ヘッド22の往復運動の-方端の直下にはポンプユニット24が配設されており、

ヨポンプコニット位置まで被送されたヘッド22に対し ューブ22gに対する初期充填処理を実行することがで **ト位圧を作用させることによった増粘インクの吸引やか**

[0050] ヘッド啓敷的16は図示しないケーブルか 介してポンプユニット24に対して所定の駆動电圧を印 加するようになっており、印刷中に一定時間が経過する ヘッド22に所定のインク吐出を実行させるし、上記操 作ボタン32における所定の操作に応じてインク種類に むじたクリーニング条件を参照するとともにヘッド22 に所定のクリーニング操作を実行できるようになってい 5。さちに、インクカートリッジの交換後毎にはチュー ヒインクの種類に応じたフラッシング条件が参照され、 プ22aに対する初期充填処理を実行する。

[0051]図5は、上記構成において本発明にかかる プリンタ制御装置が実施する制御の概略を示した概略図 である。プリンタ制御装置において主な制御は上配CP ため、CPU12は上記カートリッジメモリ43aに配 憶されたインクの種類とフラッシュメモリ14に配憶さ れたインクモードとを比較して、インクモードとして記 **憶してある現在使用中すなわちインク供給系にインクが** 充填されているインクの種類とインクカートリッジ43 に充填されているインクの種類とを一致させた状態で印 U12が担っており、インクの種類に応じた処理を行う 別を行う。

[0052] また、これらの比較によって一致している とされたインクの種類に適合した条件でヘッド22を駆 助するためフラッシュメモリ14を参照し、現在使用中 のインクの種類に合わせて顔料系制御あるいは染料系制 詢のパラメータを使用してヘッド22を駆動する。さち ンクの種類に応じたカウンタ係数を乗じてインクの使用 **量を算出するとともに、当該使用量を上記カートリッジ** ることにより、個粒紙インクでもらても緊軽紙インクだ に、本実施形態においてはCPU12とASIC13と に、ASIC13にてカウントされているドット数にイ メモリ438のインク数由から蒸じるようにして更挺す ヘッド慰動的16とコントロール1041aとが上記へ あってもインク残量を正確に記憶していく。 このよう ッド駆動制御手段を構成する。 [0053] 図6~8は以上のような制御を含めてイン クジェットプリンタ10でCPU12が実行する処理の フローチャートを示している。図6は、インクジェット [0054] このとき、ステップS105においてCP プリンタ10のブート後から実行される処理であり、ス テップS100ではCPU12がフラッシュメモリ14 を参照し、上記初期フラグがオンであるか否かを判別す **る。同ステップS100にて初期フラグがオンであると** 判別されないときには、上記チューブ22a毎のインク **供給尽にインクが光塩されていないとして、当数チュー** ブ22a内にインクを充填するための処理を行う。

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U12は上記コントロールIC41aと通信を行い、同 コントロール1 C4 1 aにカートリッジメモリ43aの インク種類を読み出させ、各六色のインクの種類を把握 **する。ステップS110ではこの配み出したインクの値** 関が六色とも同一の種類であるか否かを判別し、同一額 類であると判別されないときにはステップS115にて **液晶表示体31に図9に示すエラーメッセージAを扱示** 上記パネル1/033を介してパネル部30を剽御し、

メッセージを表示した状態で利用者が間違えて挿入した r。上記ステップS110にてイングの種類が六色とも 20にてインク供給系に対するインクの充填処理を実行 填される。従って、この状態でヘッド22内のピエン群 色統一されていません」というメッセージであり、当駁 インクカートリッジ43を適正なものに取り替えること rる。当**校**充塩処理はインク供給系にインクを充填させ る特別なシーケンスであり、かかるシーケンスが実行さ **され後にはインクガートリッツセのインクポインク 供給** 乐に充填され、ヘッド22のインク室内にもインクが充 子を駆動するとヘッド22のノズルからインクが吐出さ 【0055】エラーメッセージAは「カートリッジが6 同一の循類であると判別されたときには、ステップ S 1 を促しつつ上記ステップS105以降の処理を繰り返 2 ន

に、ステップS130にて上記フラッシュメモリ14に アクセスして上記初期フラグをオンにする。このような 135にて上記フラッシュメモリ14にアクセスして上 [0056] この充填処理の後には、ステップ S125 にて上記フラッシュメモリ 1 4にアクセスして上記充填 したインクの種類をインクモードとして歓定する。さら **充填処理を行った場合と上記ステップS100にて初期** フラグがオンであると判別されたときには、ステップS Eインクモードを読み出すとともに、ステップS140 にて上記コントロールIC41aにカートリッジメモリ **クカートリッジ43に充填されたインクの種類を把握す** 43gのインク種類を筋み出させ、装着されているイン 8

を実行する。ステップS145にて両者が一致している ル1/033を介してパネル部30を制御し、液晶数示 モリ14に記憶されたインクモードとが一致しているか いると判別されたときはステップS200にて印刷処理 否かを判別する。 ステップS145にて両者が一致して と判別されないときにはステップS150にて上記パネ トリッジ43に充填されたインクの種類とフラッシュメ [0051] そして、ステップS 145にてインクガー **本31に図10に示すエラーメッセージBを投示させ**

なるインクが装着されています」というメッセージであ 【0058】 エシーメッセージBは「インクモードの概 り、当該メッセージを表示した状態で利用者が間違えて ය

挿入したインクカートリッジ43を適正なものに取り替えることを促しつつ上配ステップS140以降の処理を終り返す。 ステップS200の印刷処理においては上記コンピュータ50から印刷指示とともに印刷データ送信されるのを待機しており、印刷指示の後に図って示す処ます。

[0059] ステップS205では、上記ASIC13 にアクセスして問ASIC13内のインク使用盤ステップS210にてカウンタを「0」にクリアし、ステップ グ230にて上記コントロールIC41aにカートリップメモリ43のインク類型を脱び出させ、装葺されて いるインクカートリッジ43に実践されたインケの種類 を把握する。そして、ステップS215にてフラッショメモリ14にアクセスし、当該インクの種類に適合した

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[0060] ステップS220以降においては上記コンピュータ50から送信された印刷データに描るいて所定ライン分の駆動を行いつつ印刷を実行する。ステップS20では、上記インクの種類に適合した印刷条件の駆動毎年を禁災して上記AS1C13代格令を送信し、ヘッド型を転削16に上記パルスを出力させることによってヘッド22を駆動する。このようにしてヘッド22を駆動し、キャリッジにてヘッド22を移動とせるなどして印刷を実行しつ、ステップS225ではAS1C13にてカウントを実行している。

[0061]所定ライン分の印刷が幹了するとステップ S230にてフラッシュメキリ14にアクセスしてインクの種類に適合したカウンタ係数を誘み出し、ステップ S235にて当弊額み出したカウンタ係数と上配AS1 C13のカウント値とを乗ずることによってインクの使用金を与出する。ステップS240では、上配コントロール「C41aに指令を送り、カートリッジメモリ43aに配信されたインクの使用金を成じるようにして当該インク数金を更新させる。ステップS245では上配AS1C13にアクセスして同AS1C13的のインク使用金ステップS210にてカウンを再び「0」にクリアす [0062] そして、ステップS250においては上記コンピュータ50から送信された印刷でサックの全てを印刷しはえたかるかを判別し、印刷し終えたと判別されるまで上記ステップS250以降の処理を繰り返す。尚、本実施形態にて上記ヘッド22はキャリッジによる往復週かの一方の塔位置においてフラッシングがなされる。すなわち、印刷中に一定時間が経過した後には、ヘッド22がフラッシング保板に手に解送され、フラッシュメックは最に適合するフラッシング条件を研み出しつつフラッシングを発行する。また、本業施形態においてロンフラッシングを発行する。また、本業施形態においてロンンシクカードリッジ43が取り外されたさきに印刷を実行

し続けることを訪止するため、上記インクカートリッジ43が取り外されたときにコントロールIC418が出力する信号が検出されたときには図1のステップS205~S250の処理を中断して図8に示す処理を実行す

晶接示体31に図11に示すエラーメッセージCを接示 させる。エラーメッセージCは「カートリッジを装着し 5310にてインクカートリッジ43を装着したことを とを示す信号が検出されると、ステップS305にて上 記パネル1/033を介してパネル部30を制御し、液 て下さい」というメッセージであり、当蚊メッセージを **敷示した状態で利用者がインクカートリッジ43を装着 トることを促しつのステップS310にてインクカート** リッジ43を装着したことを示す信号が検出されるまで 上記ステップS305以降の処理を繰り返す。 ステップ Fす信号が検出されると、ステップS315にて上記フ ラッシュメモリ 1 4 にアクセスして上記インクモードを 説み出すとともに、ステップS320にて上記コントロ **一ルIC41aにカートリッジメモリ43aのインク猫** [0063] インクカートリッジ43が取り外されたこ 類を読み出させ、装着されているインクカートリッジ4 3に充填されたインクの種類を把握する。

[0064]そして、ステップS325にてインクカートリッジ43に充填されたインクの種類とフラッシュメモリ14に記憶されたインクモードとが一致しているかを判別する。ステップS325にて両者が一致していると判別されたいときにはステップS330にて上記パネル1/033を介してパネル節30を制御し、液晶数示体31に図10に示すエラーメッセージBを数示させる。ステップS325にての音が一致していると判別されたとははステップS325にてフラッシュメモリ1されたフェストンクの種類に適合したカウンダ概数を摂み出し、ステップS340に工業が部み出したカウンン多係数と比配AS1C13にて保持されているカウンド値とを乗ずることによってインクの使用量を算出す

[0065] ステップS345では、上記コントロール IC41aに指令を送り、カートリッジメモリ43aに 配信されたインク残量から回ステップS340にて貸出 のしたインクの使用金み似ころようにして当数インク残量 を更新させる。すなわち、再装着されるインクカートリッジ43の充填インクが正しいか否かを判定した上で、 カートリッジが抜かれるまでカウントしていたカウント 値に払ういてインク残量を更新する。従って、インクカートリッジ43が印刷途中で取り外された協って、インクカートリッジ43が印刷途中で取り外された場合であって も正しいインク残量となる。この後、上記図7に示す印刷の理に復帰する。

[0066] さらに、本実結形態においては顔料系のインクと吹料系のインクとの双方を使用可能であり、当隊 50 インクの鑑知を成更することができる。インク系統の交 7 インク系統の交

(12)

21 数に躱した、固米疣のインクが既ざり合うと印刷物にお

扱に探して、回光板のインクのほっとのうと用いるできないと、 いて適切な物色とたないし、ヘンド22 毎の腹壁パカ インと異なることから描るの不留かが生じる。従って、 インク系括の交換に際しては、上にインク供終系の符号 も実施する返取がある。利用者あるいはサービスマン は、上記パネル節30の第作ボタン32にて所の押し 込み操作を行うことによってインクの交換処理を実施することが可能になっている。

[0067] すなわち、上配線作ボタン32において所定の押し込み操作を行うと、当数線に広じた所定のトリガが出力され、CPU12が当数トリガを受信すると印刷の実行中であっても図6のステップS40に示す交換処理を実行する。この交換処理においてステップS410では、上記ペネル部3の所温表示にステップS410では、上記ペネル部3の所温表示体31に所定のガイドメッセージを表示しながら、加手リッジが大して、インク供給系に対してカートリッジを装着させるなどして、インク供給系に新品の次担・ファッケンスを実行する。この活券処理の後に、インクはおぶに新品の次額と同様、すなわち切期フラグがオンの次数と同様であるので、上記ステップS105以過を処理を表する。

[0068] さらに、このインク系統変更等の洗浄処理の他にヘッド22を洗浄するクリーニング操作を実行可能であり、上記パネル的30の操作ボタン32にて所定の押し込み操作を実行すると、当該操作に応じた所定のトリガが出力されてPU12が当該トリガを受信すると、CPU12が上記ASIC13を介してヘッド駆動的16に指示を送り、インクを負圧により排出させた後にゴムなどの導性仮からなるワイピング部材によりヘッド数面のフィピング操作を行うようになっている。

[0069]以下、上記構成および処理フローによって とフラッシュメモリ 1 4 に配位されるインクモードの内 ASIC13内のカウント値とをタイミングチャートに し、初期フラグがオンではないとしてステップS105 されているイングは顔学妹のものと歌気妹のものとが筋 各インクカートリッジ43内に充填されたインクの種類 容とカートリッジを取り外したときに出力される信号と ン (C) , ゕゼンタ (M) , ブラック (K) , ライトツ イエロー (Y), ライトマゼンタ (LM) のインクカー [0010] いの状態や、イングジェントプリンタ10 をブートすると、上記図6に示す処理が実行され、ステ ップS100にて初雄フラグがオンであるか否かを判別 におけるインク種類の競み出しと、ステップS110に おける判別を行う。ここで、インクカートリッジに充填 **よった示したこる。本勢作例では初越状態とした、シア** アン(LC)のインクカートリッジに都対米のイング、 トリッジには弦柱米のインクが充填されているとする。 在していることから、ステップS110の判別を経て、 本英施形態にて行われる動作例を説明する。図12は、

(0071) 利用者はこのエラーメッセージAを提認することによってインクの運搬が配在していることを把握し、時刻・1にて上記イエローとライトマセンタのインクガートリッジを取り外すととに顔料系のインクガス塩されてエローとライトマセンタのインクガス塩されてエローとライトマンクガイ塩を打造する。この結果、ステップS110では全てイングルが直接を打て、ステップS120にてインク供給系に対すると判別し、ステップS120にてインク供給系に対すしる初期充填を実行し、ステップS120にてフラッシュンチリ14にインクモ・下を顔料系として設定するともにステップS130にて初期フラグをオンにするともに、初期フラグがオンになっている場

[0072] さらに、切類フラグがオンになっている毎省でも、インクジェットプリンタ10を輸送したりする解にインクカートリッジ43を一旦取り外し、再び装をした場合には、インクの強額を扱ってしまうことがある。例えば、上記切類充填をした後に時刻12で除料系のインッが光道されたインクカートリッジ43を決略してインクジェットプリンタ10をプートしたとする。

(0073)この鉛合には、ステップS100にて初期フラグがオンになっていると判別した後、ステップS135にてフラッシュメモリ14に配賃されたインクモードが値将来である音を把握し、ステップS140にてカートリッジメモリ43aに配链されたインクの種類を耐み出し染料系である音を把握する。この結果ステップS145では両者が一致しないと判別され、液晶表示体31上にエラーメッセージBを投示させる。

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(0074) 料用者はこのエラーメッセージBを視認することによってインクの種類を固築えたことを把握し、 90 時刻・3にて個料系のインクが充填されたインクカートリッジ43を決着し直す。この括果、ステップS145にイインタートと接着されているインクカートリッジのインク種類が一致していると判別をは、ステップS205にて上配AS1C13のイング用金カウンケのカウント値が「0」にクリアされ、ステップS210でフラッシュネリ14が参照され、ステップS210でフラッシュネリ14が参照され、インクモードが顔料系に設定されている目が把握される。

[0075]CPU12はさらにフラッシュメモリ14を参照してステップS215で当該部科に適合する印刷条件を誘み出し、ステップS220以降の処理にて印刷を実行する。このとき、ASIC13の上記カウント値は印刷契行とともに増加する。このまま印刷を飛けるとやがて印刷終了に至るが、印刷終了に至る前の時刻、4において利用者が何らかの理由でインクカートリッジ43(本例ではライトマゼンタ)を取り外したときには、上記コントロールIC41sがインカートリッジ

が取り外された旨の信号を出力する。 [0076]この結果、CPU12が実行していた印刷 処理は中断され図8のフローが実行される。すなわち、

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ステップS115において液晶表示体31上にエラーメ

特国2002-192810

ステップS305にて液晶投示体31上にエラーメッセ ージCを数示させ、利用者が同エラーメッセージCを視 **認することによってインクカートリッジ43を装着し直** すことを促す。利用者がインクカートリッジ43を装着 するとステップS310の判別を経てステップS315 クカートリッジ43と異なる染料系のインクが充填され たインクカートリッジ43を装着した場合には、ステッ **プS315~ステップS330の処理によってさらにエ** 以降の処理を実行するが、戦って時刻も5にて他のイン

を介してカートリッジメモリ43aを更新する。すなわ ことによって時刻 t 6 でインクカートリッジ 4 3 を顔料 と、ステップS325の判別を経てステップS335に タ係数を読み出す。そして、ステップS340にて上記 カウンタ係数を乗じることによってインク使用量を算出 ち、印刷の途中でインクカートリッジ43が取り外され インク残由が更新されるので、カートリッジメモリ43 【0077】利用者が当該エラーメッセージを視認する 時刻も4の時点までカウントしていたカウント値に当該 し、ステップS345にて上記コントロールIC418 たとしても、それまでのカウント値が保持されるととも に再び適正なインクカートリッジ43を装着したときに てフラッシュメモリ 14にアクセスし、顔料系のカウン 系インクが充填された適切なカートリッジに変更する

[0078] このように、本発明においては、インクカ やインクの残量を記憶し、インク供給米にインクを供給 インクの種類と上記不揮発性メモリに記憶されたインク の種類を比較する。この結果、両者が一致するときに当 ド駆動に応じてインク使用金を算出し、インクの残量を **ートリッジに搭載された不輝発性メモリにインクの猛類** したちそのインクの種類を記憶し、印刷時に同記憶した なインクの種類に適合した印刷制御を実行することがで き、インクの混合を防止することができる。また、ヘッ 更新するので適正なインク残量を判定することができ a に配徴されるインク残虫が適正なものとなる。

図面の領単な説明】

[図1] インクジェットプリンタの内部構成を示す概略 料視図である。

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[図3] フラッシュメモリのメモリマップの要問を示す [囚2] インクジェットプリンタのプロック囚でわる。

[図5] ブリンタ制御装置が実施する制御の概略を示し を示す図である。

[図4] ヘッド慇懃部にて生成する印加電圧のパターン

た粧略図である。

【図6】 C P U が実行する処理のフローチャートであ

[図1] CPUが実行する処理のフローチャートであ

ルーメッセージBが敷がされる。

【図8】 CPUが実行する処理のフローチャートであ

[図9] エラーメッセージの表示例を示す図である。

[図11] エラーメッセージの表示例を示す図である。 [図10] エラーメッセージの数示例を示す図である。

[図12] 各部の動作を示すタイミングチャートであ

10…インクジェットプリンタ 【符号の説明】

11…メイン基板

12...CPU

3 ... A S I C

14…フラッシュメモリ 1 6 … ヘッド財動部

20…印刷部

21... 0-5

22…へッド

22a…チューブ 30…パネグ哲

31…液晶数小体 8

40…カートリッ沙部 3 2…操作ボタン 41…サブ基板

43…インクガートリッジ 41a…コントロールIC 42…カートリッジホルタ

50…ペーンナルロンドュータ 43a…カートリッジメモリ

- S245 5250

インク使用曲カウンタケリア

日野なり

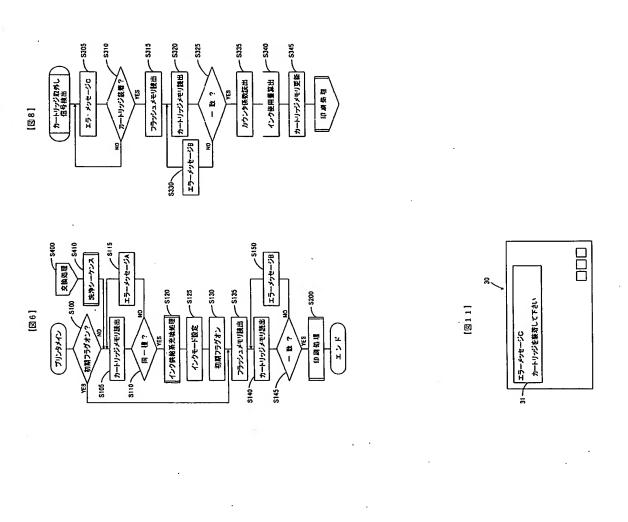
コターン

- S220 **√** S205 1 S210 - 5215 - 5225 - S235 J S240 **パンク製圧器 かりソタシン** カートリッジメモリ製出 カートリッジメモリ更知 過台印刷条件钱出 インシ使用量算出 カウンタ係数疑出 台班自由 くって記載 かひソヤ プロチクトプロック [83] ハネル部 コントロールに マンドナン ASIC [図2] CPU <u>[</u>

図4]

政策

松



インクモードの異なるインクが装着されています

カートリッジが6色材一されていません

エラーメッセージA

エラーメッセージB

[図10]

[6図]

インヤード **阿拉斯斯姆** · 東拉系制御

12 CPU

THE

イン福路・

フラッシュメモリ

t22

2

til ti2 | ti4 ti5

染料系

[图2]

434-1-1977729

インクカートリッジ

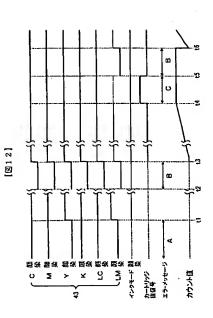
おひソカ保数

ASIC

カウント位

更新

インが指揮し



レロントページの結束

ドターム(参考) 20056 EB20 EB45 EB49 EB56 EB59 EC41 EC42 KC01 2C061 AQ05 HH03 HJ10 HK05 HK11 HK23 HN02 HN15